NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

Hold for Release
Until Launched

No. 1
9-59

SATELLITE DESCRIPTION AND EXPERIMENTS

With the firing of Vanguard Satellite Launching Vehicle 7, the last in the Vanguard series, the U. S. will attempt to put into orbit an instrument package to measure the earth's magnetic field, solar X-rays, and space environmental conditions. The instrumented payload weighs 50 pounds. Total weight in orbit, including the attached third-stage casing, will be about 100 pounds.

The satellite is made of magnesium and fiberglass, and looks much like an over-sized ice cream cone -- a 26-inch tapered tube extending from a 20-inch sphere. The tube, fabricated of glass fibers and phenolic resins and ranging in diameter from 6 to 2½ inches, contains in its tip a magnetometer to measure the earth's magnetic field. The forward section of the sphere from which the tube extends is also made of fiberglass. The remaining three-quarters of the sphere is magnesium.

The satellite's battery of 62 small silver-zinc cells has an estimated lifetime of 90 days.

These are the approximate weight breakdowns of the satellite: structural weight(including all of those items not immediately connected with the experiments such as antennas, internal supports, and instrumentation packaging) is 19 pounds; battery composed of

62 small silver-zinc cells, 22.5 pounds; and the experiments themselves including associated electronics, 8.5 pounds.

The inclination of the satellite's orbit is expected to be 34 degrees from the equator.

MAGNETOMETER EXPERIMENT - Scientists know the earth's magnetic field acts as though a bar magnet is running through the center of the earth -- at an angle of 11 degrees from the earth's geographic axis. This creates an umbrella-like magnetic field around the earth. This field, used in navigation, mineral exploration, and submarine detection, undergoes constant changes and these variations are not always predictable. Unaccountable disturbances, called magnetic storms, render tools relying on the magnetic field almost useless.

What causes these storms? Are they as predictable as our weather? Can we compensate for them? The magnetometer satellite should answer these questions.

Some theorists say that solar gas and other particles approaching the earth from outer space are sorted according to mass and energy and are guided by the magnetic field. Part of this influx builds up in pockets of high radiation. In deep space flights, man will want to avoid these high radiation zones. Space charts -- drawn from data furnished by this and future magnetometer experiments -- probably will be man's space route map.

Firings of rocket-borne magnetometers proved the existence of electric currents in the ionosphere. However, these readings were of a short duration. Day-to-day readings from varying altitudes will pave the way for more wide-scoped scientific conclusions.

Here is how this experiment will work:

The magnetometer consists of a copper coil filled with liquid (hexane) located in the sealed tip of the 26-inch tapered tube. Wires connect the coil to the electronics and batteries of the satellite in the 20-inch sphere. On command from a ground station, a relay closes which sends 6½ amperes of current to the coil for about two seconds.

Energizing the coil orients the protons (hydrogen atoms) in the liquid and sets them spinning within the coil in a prescribed manner.

After about two seconds, the flow of current stops. Then -- for the next two to two and a half seconds -- the protons spin in a wobbling orbit inside the coil as dictated by the earth's magnetic field. The frequency of their movement imparts voltage to the coil. This cyclic voltage then is amplified and transmitted instantaneously to a ground receiver where it is taped. Simultaneously a ground magnetometer reading is made.

Analyzing these two signals should tell us much about the earth's magnetic field.

The satellite will be interrogated about 50 times a day, or about twice at each pass over a tracking station. The length of the command signal and the telemetered data will vary according to altitude, battery voltage and satellite temperature which may vary from -10 to ≠ 50 degrees C. The average time the satellite will be in range of an individual tracking station at each pass is about eight minutes.

The satellite's design and materials rule out metallic interference with the sensitive coil. For this reason the tapered tube and the top quarter of the sphere were fabricated of fiberglass and asbestos phenolic resin.

During second stage burning time, the plastic nose cone covering the payload will pop off. The satellite's four antennas, equally spaced around the sphere's equator and folded upward inside the cone, will spring down into place and lock.

Thickness of the tapered tube walls is about .026 inches; the skin of the 20-inch sphere ranges from .050 to .026 inches. It is expected that the tube will precede the sphere in flight, at least in the initial orbits. Later wobbling (precession) or tumbling will not interfere with the experiment.

ENVIRONMENTAL EXPERIMENT - A more accurate knowledge of space environmental conditions is essential to the design of future satellites and manned space vehicles. This satellite will carry instrumentation to measure four specific environmental conditions, both on its surface and within the sphere. There are three measurements of temperature, two of surface penetration, four of surface erosion, and instrumentation to measure micrometeorite bombardment.

Two thermistors (tiny thermomenters), mounted on the inside wall of the sphere, will provide a time history of the average shell temperature as well as its orbital fluctuations. A third termistor will measure the internal temperature of the solar X-ray - Environmental instrument compartment.

Two pressure zones girdling the sphere will be sealed and drained of enough air to make them partial vacuums. These pressure zones are covered by about 20 percent of the satellite's shell. A differential pressure gauge connected between the zones will indicate puncture of one or both. Penetration of the magnesium shell will be telemetered as a change in length of one of the telemeter channels.

Erosion due to bombardment with dust, micrometeorites, ions, molecules, and atoms will be recorded by three metallic strips and a photosensitive detector. Resistances of the chromium strip erosion gauges will change as their surfaces change. The photosensitive detector, a cadmium sulphide cell protected by an opaque covering of Mylar plastic and deposited aluminum, will show a resistance change as the covering is penetrated or eroded. Erosion measurements will be telemetered as lengths of telemetry channels and will permit estimates of the erosion rates.

Four barium titanate type microphones will record micrometeorite impact on the sphere's surface. The microphone output is amplified and shaped and fed into a magnetic counter unit. This unit continuously provides three decimal digits of the cumulative count of impacts. The unit counts up to 1000 and then resets to zero.

X-RAY EXPERIMENT - Solar X-rays and the effects they have on the earth's atmosphere is the purpose of the third experiment in this Vanguard satellite.

The X-ray instrumentation is designed to determine the maximum variation in the intensity of solar X-ray radiation during each orbit. The experiment would thus reveal short time variation in the average X-ray emission. It would record solar flare peak intensity throughout the daylight portion of flight with a dynamic range of at least 10 angstroms. The ionization chambers are sensitive to wavelengths in the band 1 to 8 angstroms.

Instrumentation includes an electrometer circuit for amplifying the signals generated in the ionization chambers; a peak reading memory device; and an orbital switch consisting primarily of a light-sensitive solar cell. The memory device will retain the maximum X-ray signal received during one orbit. This memory core is the controlling element in an audio oscillator which modulates the minitrack transmitter (108.00 MC). Two cores will be used in an orbital switching arrangement -- the core modulating the transmitter will contain the maximum signal from the preceding orbit, while the second core will be storing data from the current orbit. The roles of these two cores will be reversed as the satellite passes from darkness into light. A third core will transmit instantaneous values of radiation.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SATELLITE LAUNCHING VEHICLE 7

Two notable changes from previous Vanguard rockets mark Satellite Launching Vehicle 7.

Although the first two stages remain the same, the third stage engine this time was made by Hercules Powder Company's Allegany Ballistics Laboratory. The solid propellant third stage has a higher efficiency than the one previously used; its burning time is 10 seconds longer. The extended burning time compensates for the payload weight of 50 pounds -- more than twice that of former Vanguard instrument packages.

The third stage casing, which weighs about 50 pounds, will not separate from the payload after engine burn-out. It will remain attached to the instrument package throughout the lifetime of the satellite, creating a larger target for optical trackers.

The launching vehicle itself is approximately 72 feet long, 45 inches in diameter at its base, finless, with a gross take-off (loaded) weight of approximately 22,600 pounds. The Martin Co. is prime contractor for the vehicle.

The liquid-propellant first stage has a gimballed engine built by General Electric Co. Its propellants are liquid oxygen and kerosene. Thrust is about 28,000 pounds at sea level.

The second stage also is a liquid-propellant rocket, burning white fuming nitric acid and unsymmetrical dimethylhydrazine. Its gimballed engine and fuel tanks are made by Aerojet-General Corp. Second-stage thrust is about 8,000 pounds at altitude.

The second stage contains the "brains" of the entire launching vehicle -- the guidance system. Minneapolis-Honeywell Regulator Co., Air Associates, Designers for Industry, and the Martin Co. provide the vehicle's guidance and control system. Also in the second stage is a spinning mechanism for the third stage.

The third stage is a solid-propellant rocket, consisting of a plastic cylindrical case, a nozzle, propellant charge, and igniter. Allegany Ballistics Laboratory made the third stage engine in SLV-7. It generates about 3,000 pounds of thrust. This engine, originally developed for the Vanguard program, is essentially the same used in the third stage of Thor-Able III which launched Explorer VI.

The first stage burns for about 140 seconds. Second stage ignition occurs within a split second after first-stage separation. During second-stage burning, a plastic nose cone enshrouding the payload pops off at plus 172 seconds. Second stage burns out at about plus 260 seconds.

Next comes a coasting period of about 260 seconds. At the end of this time the vehicle should be in the proper angle of "attitude," and altitude to put the third stage and attached payload in an orbital path. During this period, third-stage spin-up starts at about plus 500 seconds. The third stage ignites at about

520 seconds and burns out at about 560 seconds. The satellite, with its permanently attached burned-out third-stage casing has now attained sufficient velocity to carry it into orbit.

Robert W. Stroup, of the Satellite Applications Systems Division at NASA's Goddard Space Flight Center, is project officer for the payload. Experiments were developed by scientists at the U. S. Naval Research Laboratory and Goddard Space Flight Center.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

Hold for Release
Until Launched

No. 4
9-59

TELEMETRY AND TRACKING

The Vanguard satellite will be tracked by 10 NASA minitrack stations. They are located at Blossom Point, Maryland; Santiago, Chile; Antafagasta, Chile; Lima, Peru; Quito, Ecuador; Grand Turk Isle, Bahamas; San Diego, California; Esselen Park, South Africa; and Woomera, Australia. All but the South African and Grand Turk stations will interrogate the satellite and are equipped with ground magnetometers.

The satellite's tracking signal will be a steady one on 108.00 megacycles, with a power of 80 milliwatts. When interrogated by a tracking station, the 108 mc signal will be modulated by X-ray and environmental telemetry data.

Magnetic field measurements will be relayed over a 108.03 mc transmitter with a power of 80 mw. This transmitter will operate only on command from a ground station.

Baker-Nunn tracking cameras will optically track the Vanguard satellite. Optical tracking stations are located at Organ Pass, New Mexico; Olifantsfontein, South Africa; Woomera, Australia; Cadiz, Spain; Tokyo, Japan; Nani-tal, India; Arequipa, Peru; Shiraz, Iran; Curacoa, N.W.I.; Hobe Sound, Florida; Villa Dolores, Argentina; and Haleakala, Hawaii. Optical tracking will be supervised by the Smithsonian Astrophysical Observatory, Cambridge Massachusetts, under a grant from the NASA.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

Hold for Release
Until Launched

No. 5
9-59

PROJECT VANGUARD BACKGROUND

On July 29, 1955, the White House announced that the United States planned to launch earth satellites as part of this country's contribution to the International Geophysical Year which ended formally on December 31, 1958. Project Vanguard is the name assigned to that part of the satellite program which was under the management of the Chief of Naval Research. The Naval Research Laboratory (NRL) in Washington, D. C. had responsibility for technical aspects of the program.

Project Vanguard was transferred to the National Aeronautics and Space Administration by Executive Order on October 1, 1958. The transfer affected 156 NRL scientists and technologists, including Dr. John P. Hagen, Project Vanguard director.

Six firings of the Vanguard test vehicle and six firings of the Vanguard satellite launching vehicle have been made to date, starting with the May 1, 1957, experiment. Two Vanguard satellites have achieved orbit. A three-and-one-quarter pound test sphere was launched by TV-4 on March 17, 1958 (its 50-pound third stage rocket casing also went into orbit). Vanguard I, as it was christened, is still aloft, with an expected lifetime of hundreds of years.

SLV 4, launched February 17, 1959, placed about 70 pounds in orbit -- a $21\frac{1}{2}$-pound, 20-inch diameter sphere plus the third stage rocket casing which was treated with special coating to facilitate optical tracking. The satellite was named Vanguard II. The primary objective of this experiment was to measure the distribution and movement of cloud cover over the daylight portion of the satellite's equatorial orbit and relate it to the overall meteorology of the earth. The cloud-cover data are now being reduced.

Today's experiment, represents a completion by NASA of the Vanguard IGY series. Data from the satellite will be made available to the 66 nations of the IGY.

In all, 15 rocket vehicles were prepared for the Vanguard Program. Thus far, 14 have been fired including today's launching. One test vehicle (TV-2 backup) was given to the Smithsonian Institution for exhibit purposes. For additional details of the complete Vanguard program, refer to release No. 3.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

Hold for Release
Until Launched

No. 6
9-59

MEN BEHIND THE EXPERIMENTS

Following are brief biographies of the principal experimentors in this Vanguard experiment:

1. Magnetometer

DR. JAMES P. HEPPNER - A geophysicist in the Space Sciences Division of NASA's Goddard Space Flight Center, Dr. Heppner wrote his doctoral thesis on magnetic field disturbances. Before joining the NASA last December, he was active in sounding rocket research at the U. S. Naval Research Laboratory. He was graduated from the University of Minnesota in 1948, and earned a master's degree in 1950, and a doctorate in 1954, both from the California Institute of Technology.

2. Environmental

HERMAN E. LA GOW - chief of planetary atmospheres programs at NASA's Goddard Space Flight Center, is responsible for the space environment experiment. He was employed at NRL until last December and was project leader in previous Project Vanguard experiments. He was graduated in 1943 from Baylor University and has done graduate work in physics and mathematics at George Washington University and the University of Maryland.

3. X-Ray

DR. HERBERT FRIEDMAN - superintendent of the Atmosphere and Astrophysics Division at the U. S. Naval Research Laboratory. He was graduated from Brooklyn College in 1936 and received his doctorate from Johns Hopkins University in 1940. He specializes in atmosphere research with rockets, particularly in the field of solar-earth relationships.

4. NASA's project officer for this Vanguard payload is ROBERT W. STROUP, Senior Project Coordinator in the Satellite Applications Systems Division, Goddard Space Flight Center. He was employed at NRL until last December and involved in many previous Vanguard experiments. He was graduated from Davidson College, Davidson, North Carolina, with a Bachelor of Science degree in physics in 1948.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

Release No. 59-210
EX 3-3260
Ext. 6325

FOR RELEASE:
Thursday, A.M.
September 3, 1959

ARNOLD W. FRUTKIN APPOINTED
NASA'S DIRECTOR OF INTERNATIONAL PROGRAMS

Arnold W. Frutkin, an official of the U.S. National Committee for the International Geophysical Year, has been named Director of the NASA's Office of International Programs, T. Keith Glennan, NASA Administrator, announced today. Frutkin, who will join the NASA staff September 14, succeeds Henry E. Billingsley.

As Director of International Programs, Frutkin will head an NASA-sponsored program to coordinate U.S. non-military research and development in aeronautical and space matters with similar work of other nations and international organizations.

Since 1957, Frutkin has served as Director of the Office of Information, U.S. National Committee for the International Geophysical Year at the National Academy of Sciences, and in addition has been Deputy for International Affairs to the Executive Director of the Committee. For the last year he has been Secretary to the International Relations Committee of the Space Science Board at the Academy. He served as advisor to the National Academy of Science's delegate to the first and second meetings of the International Committee on Space Research

(COSPAR) in November, 1958 and March, 1959.

Born in New York City in 1918, Frutkin earned a Bachelor of Arts degree from Harvard College in 1940. After a year at Columbia University studying economics, he joined the U.S. Department of Labor as Assistant Economist, a post he held until 1942.

During World War II he served with the U.S. Navy in the Pacific Theater. He currently holds the rank of commander in the Naval Reserve.

From 1945 to 1957, Frutkin was a managing editor and member of the board of directors of the Bureau of National Affairs, Inc., a publishing company in Washington, D. C. In May, 1957 he was appointed to his current position with the U.S. National Committee for the International Geophysical Year.

Mr. and Mrs. Frutkin, the former Nannette Helen Kahn, and their two children live at 3702 Ingomar Street, N.W., Washington, D. C.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

NASA RELEASE NO. 59-211
DU 2-7611

FOR RELEASE:
Friday, P.M.'s
September 4, 1959

JULY CONTRACTS LISTED

Here is a summary of contracts toward which the National Aeronautics and Space Administration obligated money during July, 1959:

Purdue University -- $200,000 -- A three-year grant for study of the mathematics of rocket and space vehicle guidance and control.

University of Illinois -- $60,000 -- and Stanford University -- $90,000 -- For continuing studies of satellite radio signals in an effort to learn more about the makeup of the ionosphere.

Massachusetts Institute of Technology -- $200,000 -- Incremental funding for assistance in evaluating Project Mercury tracking facilities and ground instrumentation.

North American Aviation Corp. -- $100,000 -- Incremental funding for six Little Joe boosters, a combination of solid rockets to be used to boost "boilerplate" Project Mercury capsule models in tests to prove certain design features of the manned orbital flight Mercury capsule.

Minneapolis Honeywell Co. -- $70,000 -- For a system of flight control jets to be used on the Little Joe capsule models.

Mine Safety Appliance Research Corp. -- $70,000 -- To evaluate the use of two super-oxide compounds (KO_2 and NAO_2) as oxygen suppliers for extended manned space flights.

Lockheed Aircraft Corp. -- $50,000 -- For studies of a number of solid rocket configurations and payload capabilities.

Acoustica Associates Inc. -- $90,000 -- To investigate the use of sound waves to control the burning rate of solid rockets.

Aerojet General Corp. -- $90,000 -- To study the operation of a small turbopump which might be used in a nuclear rocket engine.

McDonnell Aircraft Corp. -- $3 million -- Incremental funding for 12 Project Mercury capsules. McDonnell is the prime contractor for the Mercury capsule.

NASA's Jet Propulsion Laboratory -- $250,000 -- For various research programs.

JPL -- $3.4 million -- Incremental funding for technical project supervision, deep space mission planning and the third stage of the Vega booster.

U. S. Weather Bureau (Commerce) -- $50,000 -- For meteorological analysis during 1960.

National Bureau of Standards (Commerce) -- $70,000 -- Research into boundary layer transition.

Naval Research Laboratory -- $2.5 million -- A drawing account for elements of NASA's Goddard Space Flight Development Center temporarily housed in Navy buildings in Washington, D. C. The money is to go for supplies, services and hardware furnished by NRL.

Air Force Research and Development Command -- $3.2 million -- Funding for liquid hydrogen second stage of the Centaur booster.

Air Force Ballistic Missile Division (ARDC) -- $280,000 -- For installation of special radio acquisition equipment at the Kaena Point, Hawaii, tracking station for use in communications with Tiros, a meteorological satellite. The money also will go for operational costs of the station for three months after Tiros is launched.

BMD -- $2.5 million -- Incremental funding for 10 Atlas boosters to be used in Mercury test and orbital flights.

BMD -- $130,000 -- For operation of computers and post-flight analysis of data on coming launchings of the Delta booster.

Army Ordnance Missile Command -- $150,000 -- For instrumentation to duplicate a 91-pound satellite payload which failed to get into orbit July 16, 1959, when its booster was destroyed due to an electronic failure five seconds after liftoff.

AOMC -- $1.3 million -- Incremental funding for eight Redstone boosters to be used in Mercury sub-orbital flight tests.

AOMC -- $100,000 -- Funds to cover the cost of the Project Beacon payload launched August 14, 1959, which failed to get into orbit due to a guidance failure.

AOMC -- $650,000 -- Incremental funding for five Juno II boosters.

AOMC -- $300,000 -- For completion of lunar project studies.

- END -

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

NASA RELEASE NO. 59-214
EX. 3-3260
Ext. 6325

FOR IMMEDIATE RELEASE
September 10, 1959

NASA AWARDS CONTRACT FOR GODDARD SPACE FLIGHT CONTROL CENTER

A contract was awarded today by NASA for the third building to be located at its Goddard Space Flight Center, Beltsville, Md.

The $2,244,695 contract was awarded to Humphreys and Harding Inc., New York, N. Y. The building will house the flight control and range operations functions of the Goddard Center.

It will be built in two sections. The first, scheduled for completion in the spring of 1960 to allow early occupancy by the Goddard Operations Division, will house tracking, data handling, ground command, and other flight control operations. The second section, to include supporting office space and briefing rooms, is scheduled for completion in the fall of 1960.

The 100,000 square foot building, to be occupied by a staff of about 250, will include a partial second story. It will be built on the 550-acre tract north of Washington, D. C., located east of the Baltimore-Washington Parkway.

Construction is underway on the first two buildings at the site -- the Space Projects and Research Projects Buildings -- with completion scheduled for mid-1960.

Pending completion of this facility, the Goddard Operations staff is quartered at the Anacostia Naval Station, Washington, D. C.

- END -

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

FOR RELEASE:
9 p.m. Monday
September 14, 1959

Address by T. Keith Glennan

Administrator

National Aeronautics and Space Administration

before the

Council for Financial Aid to Education

Pittsburgh, Pennsylvania, September 14, 1959

There are several good reasons for my being here with you tonight. First, I am happy to participate again in a small way in the activities of the Council for Financial Aid to Education because of my sincere convictions about the importance of the work of the Council. Second, as a public servant responsible for administering the nation's civilian space program, I appreciate having the opportunity to tell you something about that program. Finally, I knew that I would find many old friends among this audience -- and I have not been disappointed.

Your discussion today is a familiar one to me: The needs of our higher educational institutions and some of the methods by which support and encouragement can be provided to those institutions which are dependent principally on private financing for their continued growth to better serve their communities and the nation. In their connection, I am sure many of you read Frank Abram's recent paper entitled "Education is Everybody's Business." I am reminded that the space research business, in which I am engaged, also is everybody's business. Both need leadership of a high order by men of intelligence, humility, inspiration and courage. And, I might add, the hide of a rhinoceros and an unusual amount of physical stamina.

Associated as they are in my mind, I want to take enough of your time tonight to link these two fields -- higher education and this nation's space business -- as matters deserving the attention and thought of men like you. Accordingly, I'm going to tell you a bit about my present business and then relate it to the educational system of the nation and particularly the segment of that system with which this meeting is immediately concerned -- higher education.

To tell all I think you should know about the nation's space program would take a long time. But I think I can give in a few minutes something of the dimensions of the program and then illustrate its complexities by describing briefly one important project -- the manned satellite effort known as Project Mercury. I shall use a few slides to make more graphic and hopefully more understandable certain parts of this discussion.

This nation's real concern with space began on the fourth of October 1957 when the Soviet scientists and military teams launched Sputnik I. Before then there had been considerable discussion within military and scientific circles. The announcement in 1955 of proposed satellite launchings by the United States Committee for The International Geophysical Year had provoked some interest. The military services had been supporting some space projects, but had kept them under heavy wraps. Generally speaking, you will recall, it was considered quite indecent to be part of the lunatic fringe who believed with all their being that man's next great adventure was to be the exploration of space.

In the aftermath of national chagrin at having been bested at a game in which we thought we had all the cards (somehow we had forgotten the fact that the Russians had done pretty well in the nuclear race) two significant developments occurred: First, the Administration and the Congress agreed that science and technology really were important aspects of the national economy. Second, we all became concerned about the quality of our educational system. Of these, the second, in my opinion, has by far the more important long range implications and values.

Out of the reaction by Government was born the National Aeronautics and Space Administration (NASA). Its purpose, as stated in the law, is to develop and manage a national program of aeronautical and space research and exploration in such a manner and of such a character as to contribute effectively to the peaceful pursuit of knowledge for the benefit of mankind. The probability that certain types of operations using the space enviornment will have military significance was recognized and the responsibility for these operations and the pertinent and supporting research and development in these areas was assigned to the Department of Defense. In all of these operations, the law states that we are to so manage our programs as to assure the position of the United States as a leader in the field. In my language, being a leader in a two-horse race does not permit us to run second.

NASA will be one year old on October first. Presently, there are somewhat more than 9,000 employees on our rolls and we expect to be about 10,000 strong at the end of the current fiscal year, 30 June 1960. Some 8,000 of these people were inherited from the National Advisory Committee for Aeronautics -- the NACA -- which we absorbed when we started in business. In addition, we employ the services of some 1500 staff members of the Jet Propulsion Laboratory in Pasadena under a management contract with the California Institute of Technology. About one-third of the total complement are professionally trained people.

In addition to the Jet Propulsion Laboratory, we operate three large research centers and two smaller research stations, all inherited from the NACA. A new center -- The Goddard Space Flight Center -- is under development in the Washington area and will house many of our space flight development activities. Our total plant investment is approximately $500,000,000.

In fiscal '59 we operated on a total budget of $335,000,000. In the current year we will have a $500,000,000 program. What fiscal year 1961 will bring in the way of program level is now in the Washington budgetary mill, but I have been consistent in my warnings to all concerned that our program is bound to require larger sums of money in the next few years unless a drastic change is made in program objectives.

Now, what are we doing with all of these people and all of that money. We have completed -- or nearly completed -- the several projects turned over to NASA by the military departments a year ago, involving attempts to place satellites in earth orbits. We have placed one small payload in orbit around the sun -- truly a probe into deep space. We have built an organization and developed a sensible, well-planned program for the next few years. We have identified our long term objectives in the pursuit of knowledge about the space environment and the application of that knowledge for the benefit of mankind everywhere.

The program itself involves the undertaking of a broad range of scientific experiments in space and the development of possible applications in such fields as communications, meteorology, geodetics and navigation. To undergird these activities we have had to institute a costly and far-reaching program of space vehicle development -- the design, fabrication and testing of new and more powerful rocket booster systems. We have initiated the installation of new satellite tracking and data acquisition stations in various parts of the world. As the top priority project on our list -- the one to which all of the others contribute in some way -- we have undertaken Project Mercury -- and I want now to describe this project to you in some detail.

One day within the next few years, a young man in a pressure suit will step from a gantry tower into a checkered capsule atop a giant Atlas missile. About one hour later, with the pilot secure in a form-fitting couch facing upward, the hatch will be bolted. With a roar, the missile will streak into space.

Project Mercury, the fruit of millions of dollars investment and untold man-hours of work by thousands of scientists and engineers in NASA, the military, and private industry will reach its climax. It was on October 5, 1958, four days after NASA became officially operative, that Project Mercury was born. The project has two objectives: 1) Scientific. We wish to study human capabilities and reaction in the space environment; and 2) Technological. We wish to study the system requirements necessary to sustain the launch, flight, and successful re-entry from orbital speeds.

Last April, as you know, we selected seven Mercury Astronauts from among hundreds of military test pilots -- an amazing group of young men all of whom are in superb mental, physical and psychological shape. One of them will be chosen for the historic first flight.

NASA's Space Task Group at Langley Field, Va., directs the project with assistance from the Advanced Research Projects Agency of the Department of Defense and the Armed Services.

Now lets look at some of the slides.

The first slide shows some of the guidelines for Project Mercury.

In order to accomplish at the earliest possible time the objectives that I have just stated, the project has been developed around three basic principles: First, simplicity and reliability. The entire project should have the simplest and most reliable approach conceivable at the present state-of-the-art. Second, no prolonged research. The project should require a minimum of new developments and breakthroughs. This is, of course, consistent with the first principel. Third, and very important, the method chosen should permit a gradual build-up in technology and performance culminating in the final orbital flight.

To satisfy these objectives, the so-called high drag or blunt nose body was chosen for the vehicle because we simply know more about this kind of re-entry than any other kind.

In order to minimize the need for new developments, a standard ICBM, the Atlas, was selected as the take-off vehicle.

Capsule deceleration and re-entry will be accomplished with small retro-rockets. In the interest of simplicity, it was decided that the landing should be made by parachute. Finally, and very important, it was decided that a positive escape system should be incorporated in the vehicle to assure, to the greatest possible extent, astronaut safety. The system operates in the event of malfunction during the launch phase or before the vehicle attains orbital flight speeds.

With this background of the objectives, principles, and approaches selected for Project Mercury, let us see where the first man will fly if our method of approach is successful.

The next slide shows that the Mercury vehicle will be launched from the Atlantic Missile Range, Cape Canaveral, Florida, in a direction just slightly north of east so that it will pass over Bermuda during the orbital injection process. Actually the vehicle will fly in a closed circular path around the earth but when such a path is projected on a flat map representation of the earth's surface, we end up with the apparent undulating or sinusoidal path shown here.

According to present plans, the vehicle will, as I said, circle the earth three times, taking about $1\frac{1}{2}$ hours an orbit for a total flight time or about $4\frac{1}{2}$ hours. On the third pass, as the vehicle approaches the western coast of North America, the retro-rockets will be fired, reducing the flight velocity about 500 feet a second. This decrease in velocity will cause the vehicle to enter the atmosphere on a ballistic flight path and it will eventually land in a recovery region in the western Atlantic Ocean. A recovery team of U. S. Navy and Air Force units will locate and retrieve the vehicle and the Astronaut.

Now the vehicle that will actually make this momentous journey around the world in $1\frac{1}{2}$ hours is shown on the next slide. We refer to it as a capsule because it is essentially just that -- an air-tight, water-tight, conical chamber in which the man and all of the equipment necessary for the flight are housed. In this slide the capsule is oriented in the position it will have on take-off, when it will lift vertically toward the top of the slide. It is also the relative position it will have on re-entry where it will move in a direction from the top to the bottom.

The pilot will lie in a form-fitting,foam rubber couch. During the course of his flight, he will be able to control the roll and pitch of the capsule by using small jets. The retro-rockets are shown as they will be attached at the bottom of the heat shield, which will dissipate the heat generated on the front of the capsule during the re-entry from space. The cylinder at the top of the capsule contains parachutes used in the final descent.

My next slide shows the lash-up of the capsule on the Atlas booster as it might appear during the early stages of the launch. In this slide the escape system is shown mounted on the upper end of the capsule.

In the unhappy event that the escape system might have to be utilized, the sequence of actions shown on the next slide would be expected to occur. After an indication of impending disaster, rockets mounted on the tripod arrangement on top of the capsule would be armed and fired as the clamp holding the capsule to the Atlas booster is released. I might say that an analysis of booster malfunctions of the sort that would cause us to use the escape system has indicated that, with proper instrumentation, enough time should be available to activate this escape system.

The escape rocket has sufficient thrust to pull the capsule away from the booster rocket rapidly and far enough to escape any effects of a booster explosion. If there should be a malfunction on the launching pad for example, the escape system would whip the capsule over 2,000 feet in the air within seconds. At the peak of its escape trajectory the escape rocket and tripod would be separated from the capsule. The capsule would then be turned to the proper re-entry position, the parachute would be deployed and the capsule would be landed at a low enough velocity to avoid injury to the Astronaut.

The sequence of events that will occur during a normal orbital flight are shown on the next slide. After a conventional Atlas launch from Cape Canaveral, the booster will go through its normal firing sequence. The booster engines will drop off at a relatively low altitude and the sustainer engine will continue to fire as the vehicle lays over until orbiting speed is obtained, at an altitude of about 110 miles. During the booster flight the escape system will be jettisoned after the booster engines drop off in the staging point. When orbiting speed is obtained the capsule will be separated from the booster and will proceed on its own. It will be immediately turned around to its design flight condition with the blunt end forward and will race around the world the chosen number of times.

The retro-rockets will be fired at the proper time and the capsule will gradually re-enter the atmosphere. A drogue parachute will be opened at about 70,000 feet to stabilize the capsule during its transonic flight speeds in the upper atmosphere; the main parachute will be opened at about 10,000-to-12,000 feet altitude for the normal landing sequence. Incidentally, the capsule will have a second emergency parachute in the event of malfunction of the main chute.

My next slide will give some idea of the amount of work that must be accomplished successfully before this first manned orbital flight. Here we see several booster vehicles considered in our early planning for the flight testing the Mercury system prior to the final flight. Our studies have lead us to eliminate the Jupiter vehicle, so our rocket flight test program is actually being carried out with the other three types of vehicles.

On the left is a special rocket booster developed for the Mercury flight test program. It is a cluster of eight solid propellant rockets. The Project people call it Little Joe because of its small stature compared with other rockets in the program. Little Joe will be used to launch capsule test vehicles to a maximum distance of a little more than 100 miles for evaluation of the structural and aerodynamic correctness of the capsule design. Little Joe is also being used to test the escape system at high velocity.

The Redstone booster will be used for further tests of the capsule and its instrumentation and will also serve a very important role as a trainer for the Astronauts prior to full orbital flight. An Astronaut can ride in the capsule mounted on the Redstone for a maximum distance of about 120-130 miles. During this flight he can experience all of the sensations that will later be encountered during the launch and re-entry of the capsule, with none of the hazards of a complete orbiting flight.

The Atlas booster will be used not only for the final launching of man into orbit but for earlier suborbital tests of the final capsule configuration on flights up to 1,700-to-1,8000 miles. When used as a test vehicle, the Atlas can be programmed to subject the capsule to all the launch and re-entry conditions that will be experienced in the final orbital flight.

My final slide, shows the seven Mercury Astronauts -- four of them sitting beside a pool -- with other people getting ready to take underwater training. Dedicated, sober, intelligent and highly charged with both the spirit of adventure and the spirit of scientific inquiry, they will carry out this nation's most exciting venture into the unknown in which man himself may participate.

But back of these men is the thought and effort of thousands of well trained scientists, engineers, physicians, physiologists, psychologists and other professionally trained people -- the product of our educational system. Ahead of us lies the unknown future of which only one thing is certain -- it will be different from the present -- different in many ways -- more complex in terms of technology -- more demanding in terms of the skills to be required in management, in diplomacy and, in fact, in every walk of life. And all of this will place increasing demands on our educational system.

This thought brings me back to the statement I made earlier in this disucssion. In my opinion, our concern for the quality of our educational system which followed immediately and vocally on the heels of the launching of Sputnik I was, and is more fundamentally important, than our attempts to develop an effective program of research in space. We do not have to choose one or the other -- we can have both if we choose that course and are willing to pay the bills.

Frank Abrams has pointed out that we must invest at least $500,000,000 more each year than we presently are providing if our higher educational system is to meet the requirements we will place upon it. Let me point out to the audience that with little more than the challenge of the Soviet success in launching their Sputniks, we are now spending in our civilian space program alone more than $500,000,000 a year. When we add the military expenditures for space research we approach the billion dollar mark, and these amounts seem certain to increase in the years ahead. From which activity do you think will come the greater long term benefits?

Now I know that the problem is not quite as simple as that question would imply. But it is clear that the fundamental element in each of our activities -- be it the conduct of research or the beneficial use of the products of that research -- the fundamental element is the individual, well trained and able to apply his knowledge and to exercise leadership in the quest for peaceful and beneficial activities for mankind.

On my desk as I prepared this paper was a card on which the following words were printed -- "Many moons ago, Confucius say - Never start vast project with only half vast idea." For the past several years, The Council for Financial Aid to Education has been presenting to the nation's business community a vast project for the support of higher education by industry based on the equally vast idea that higher education is, in substantial measure, one of the fundamental responsibilities of the modern corporation.

This idea has been accepted, in principle, by a wide segment of industry but the project continues to need leadership of a high order from the industrial community itself. While I have faith that this leadership is developing, I am convinced that time is a factor that is running against us. Urgently, then, this need must be met. To this task I know the men in this room will devote their full energies. And as we go forth tonight let us resolve to give increasing heed to Frank Abrams' charge that education is indeed everybody's business.

- END -

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WASHINGTON 25, D. C.

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ASTRONAUTS PRESS CONFERENCE

September 16, 1959

11:00 a.m.

Air Force Ballistic Missile Division

Inglewood, California

* * *

MAJOR IRVING NEUWIRTH: Gentlemen, in the interest of getting as much information in as short a time as possible, we request that you restrict your queries to the subject at hand, which is the Project Mercury, the Astronauts, and the Air Force support of their mission.

We are ready to begin now. I would like to introduce Major General Osmond J. Ritland, Commander for Ballistic Missile Division.

GENERAL RITLAND: Good morning, gentlemen. We are most pleased to have this opportunity to meet with you gentlemen and to discuss with you some of our activities in the Project Mercury.

As you know, we in the Air Force Ballistic Missile Division have a certain responsibility in Project Mercury. The Division, with its contractors and the local complex, including STL -- Space Technology Laboratories -- has the responsibility for launching the Project Mercury, guiding it into orbit, developing an abort system, and the participation in the communications and tracking later on in the program.

There is a great correlation to the work that we have to do for these young gentlemen as it applies to the work that they have been doing in the flight test business in the past. We are part of their team.

Our purpose here today is to brief the Astronauts on our activities, what we are doing, what we can do for them, and what they can do for us.

More specifically, we are the part of the team that they are used to -- the flight test engineers and the maintenance people that they have been operating with in testing aircraft.

Accordingly, to make a project of this type work, we have to be on a first name basis. We have to work very closely with one another. This is our first meeting. We will be spending two days in briefing and discussing our mutual problems.

But most of all, we are going to get closer together on an informal basis on a first name basis so that we can accomplish this objective for this country at the earliest possible date. I think that through this approach we will be successful in attaining the objectives of Project Mercury.

I would like to introduce General Doolittle, whom you know very well.

GENERAL DOOLITTLE: I have no words of wisdom. I would like to welcome, along with you, the Astronauts here, and wish them well, and to assure them that the facilities of STL are entirely at their disposal for any way in which we can be helpful.

GENERAL RITLAND: I think you all know Colonel Powers. He was with us for some time out here. He will take over now and introduce the Astronauts.

POWERS: Thank you, General. Let me say first of all it is good to be back. I see a lot of familiar faces. It feels good to be among you again.

For your use, your pictures, your copy, left to right: Malcolm Scott Carpenter, Leroy Gordon Cooper, John H. Glenn, Virgil I. Grissom -- he prefers "Gus", Walter M. Schirra, and Alan B. Shepard.

The only reservation I have in acting in behalf of the NASA Space Task Group is that on occasion there may be a general question about the project which the Mercury Astronauts may be less well equipped to answer than I, in which case I will answer in behalf of the Agency.

Gentlemen, do you have any questions?

QUESTION: We have only six Astronauts here.

POWERS: Donald K. Slayton is not with us. He is back at Langley, catching up on some book work. He picked up a slight virus last week, and we decided to give him a little rest. It would be better for him, better for us, and better all around if we came on without him.

QUESTION: I would like to know if there will be any suborbital Atlas operations as well as Redstone.

GLENN: No, none of those are scheduled at the present time. To my knowledge, there is no plan at all to make any suborbital flights with anything except the Redstones.

QUESTION: Will a man who makes the Redstone flight carry right on through, or will all of you gentlemen make Redstone flights until you get to the final portion of the program?

GLENN: This is not a real definite laid-out program yet, as far as that part of it goes. The way the first Redstone flights progress, the unmanned and then the animal shots, will determine of course how many of the Redstones we have to use in the program, with of course a limited number of Redstones in the whole program.

Certainly the majority of us will ride the Redstone, I am sure. But there is no certainty that that man who rides the first Redstone will also be the one who carries on into the Atlas at all. There is no progression there set up now.

POWERS: I think maybe to ease this give and take a little bit we will start with Alan Shepard and ask each of the Astronauts to tell you what his particular area of specialization in the Project Mercury is.

SHEPARD: To start with, to define what this area of specialization means, as you know the entire program of putting a man in space is a very complex one. We will be trained in all of the facets of the program to the degree which we feel we can logically accept.

In addition to that, each one of us has a particular area which has been assigned to us for individual study. The main process here is that each one of us takes his area and studies it much more carefully than the rest of the group, and then we are responsible to the rest of the group for that particular area.

With that as a foreground, the areas with which I am concerned are the recovery of the capsule after landing, and the world-wide tracking range of stations. In the first case, of course, the capsule is programmed to land in the water in the vicinity of the Atlantic Missile Range. The monitoring of recovery efforts is one of my considerations.

The second, as you well realize, as this capsule goes in orbit around the world, we want to keep in as close contact with it as possible. Not only voice communication but also telemetering and finite tracking. So these are my two areas of consideration.

Now I will turn it over to Walt.

SCHIRRA: He made it much easier for me. Now I can condense my statement.

I am concerned with the environmental control system. Another way of putting it would be the life support system within the capsule while the capsule is in orbit.

This involves maintaining an atmosphere which is approximately equivalent to 27,000 feet around our normal atmosphere in the earth area. This will be maintained in the cabin itself and will be backed up by a full pressure suit that the Astronaut will wear while in orbit.

The full pressure suit has a requirement for ventilation which will be part of its normal mission. The full pressure suit as a pressure suit alone is a back-up in case there is something wrong with the cabin system. The ventilation is a requirement to withstand the heat upon reentry.

That, in a sense, is about what the environmental control system would amount to.

GRISSOM: My area of responsibility is the flight control system and the autopilot. At the time the capsule separates from the Atlas the automatic pilot takes over and puts the capsule in the proper position for orbit, and controls it in its attitude as it orbits around the earth. This also includes the sensors that sense the horizon in order to control the attitude properly. It includes the reaction controls that are used to change the attitude of the capsule. It includes the hand controller which the pilot can use at his option to control the attitude of the capsule himself, or in the event of an automatic pilot failure he then can control the attitude of the capsule.

I guess that is about the area that I cover.

GLENN: My area is the cockpit layout, or the Astronauts' working space in this. As far as the presentation of instruments, the information from the instruments to the pilot goes, the way we want these laid out, how we want the cockpit organized. This is an area, of course, that had to come up almost immediately as soon as we got on the project, so we have already done quite a bit of work in this field. This is something that had to get firmed up fairly early in the program.

It is also an area that is a little difficult to tie down sometimes because it is an opinion area. As any of you who are pilots know, you can get as many ideas on instrument layout as you have pilots to give the ideas.

We have had a lot of give and take in this area in firming up the instrument layout for the cockpit.

COOPER: My areas are the ballistic flights with the Redstone missile, both the stability and the performance of the combination of the missile with the capsule on it.

CARPENTER: My area is communications and navigation. The communications end touches on telemetry and voice communications and some of the radar installations, beacons and so forth. Navigation for this mission is about half the job that it would be in other applications.

It is generally detection of and correction of errors. In our case it is solely a detection, since we don't have the capability of correcting.

This touches on maps that we will be using, plus the periscope which gives us the visual presentation of the ground over which we are flying.

QUESTION: I would like to ask, in the attitude change, the 180 degree switch, does that come right after going into orbit or before reentry?

GRISSOM: As soon as the capsule separates from the Atlas it rotates 180 degrees into the retro attitude. In case there is a malfunction at this time, if the speed isn't right up to what it should be for orbit, the retro rockets can be fired to bring us back in.

QUESTION: The attitude change and the horizon centers seem very similar to the Discoverer program. Are you following that very closely?

GRISSOM: We try to follow all programs as closely as we have time for.

QUESTION: At what state of the flight was the escape tower jettisoned?

SHEPARD: The escape tower is jettisoned shortly after staging. In the case of the Atlas of course that means --

QUESTION: At half staging?

SHEPARD: When the nose drops off. Shortly after that time.

SHEPARD: Another means is provided in addition to this for separating the capsule from the Atlas. It is one which doesn't actually show when the capsule is joined to the Atlas. It sits down underneath the grounded body of the Atlas and it is a much lower thrust rocket. At that time of course you would be in an environment which is close to a vacuum.

QUESTION: I would like to know the maximum number of transverse Gs you expect to take on your reentry, and for what period of time.

SCHIRRA: For the normal mission, where nothing would go wrong, where we didn't have to use any escape mechanism, the maximum Gs would be between 8 and 9. This would be on reentry as well as on boosted flight into orbit up to orbital insertions. Of course it would then reduce to zero. The impact G is on the order of about 18 to 20 Gs; somewhere in there.

QUESTION: How long have you been taking 8 or 9 Gs.

SCHIRRA: I had better look down the line for that one.

GRISSOM: Do you mean how long will you sustain that 8 or 9 Gs?

SCHIRRA: It is not very long. It is probably about 10 or 15 seconds at the most, at the peak. This would be some level above, say 5 or 6 Gs, which is a very low order of G, particularly in the position we are in.

QUESTION: You have seen the X-15. What do you think of that half rocket half airplane?

GLENN: Well, we have just completed talking with some of the people at Edwards about the X-15 and received a real good briefing up there. We talked with the pilots, Scott Crossfield and Bob White, people up there. Our feeling I think pretty much matches theirs, that these are complimentary programs rather than competitive programs.

We feel that there is a great deal to be learned in both programs. Certainly we will have a cross-feed of information back and forth that will benefit both programs. The information that both programs are getting is certainly needed for the design of better future space vehicles.

We each have our areas of specialization, of course, in the information we are going for. But certainly we are not competitive programs. We are complimentary programs, is the way we look at it. That is the same way the pilots up there look at it.

QUESTION: Do you think that the first true space man will be one of you, or the man who flies the X-15?

GLENN: This is something I am glad you brought up on the "first" thing. This is something we all feel very strongly about. We are trying to more or less play down the idea of who will be the first man. I know that this is of big interest to the press and so on, but we feel that we are all extremely fortunate to be just at this time in history, more or less, where we can take part in such a big venture as this.

We feel that is much more important than whose name happens to be on the first ticket to go.

As far as which program we would consider to be the first man in space, I don't know. We are both getting the same altitude. We will be the first into orbital flight with this. They don't plan orbital flight with the X-15 right now, of course. So you can differentiate it that way, if you would like.

As far as who gets to the altitude first, I don't know. This seems to me to be relatively unimportant.

SHEPARD: Could I add to that? That was a very fine comment, I think. I think something here is very pertinent to your question, related directly, really, in that we can't afford to quibble about this sort of thing.

We are concerned with advancing the technology. I think if you want to speak seriously about advancing technology and racing with anyone, that we have other considerations outside the continental limits.

QUESTION: How will the first man be selected? What will be the determining factor?

POWERS: I don't think we have an answer for you right now. If these Astronauts maintain their current highly competitive levels of capability, it could well go to lot.

QUESTION: Have any of you any ideas as to which simulation training program you consider the most effective and most important; that is, work with the side stick controller in the air-bearing chair setup, or centrifuge work, or a combination centrifuge-periscope, or what part of it? The work with the control system or what?

COOPER: I think they all are very important. I think that each one has had its area of importance in training. It would be hard to say any one particular one might be the very most important one. Any one would probably leave a notch out if you left it out.

I think that for the mission simulation, as far as feeling the G forces in the practice of controlability, one of the best ones we have had so far has been the centrifuge. However, there will be others that will be equally as important and equally as good a training.

SCHIRRA: I would like to add a comment to that, Gordon. The first thing I think of is the fact that not all simulators are ready. So as a result we are doing parts of it. For example, in the centrifuge we use the side-arm controller coupled into an analog computer, and then experience Gs and try to find out what work level we could perform, or task level we could perform, while undergoing Gs.

As a further step to that would be the illusions and sensations on this air-bearing couch, for example, again using the side-arm controller, tying the periscope together with the instrument presentation.

So each one is adding. And as they become available they will become more interesting until we have the whole capsule to practice with.

QUESTION: Are there any plans to integrate all of these things together, to try to get as close control simulation as possible up to the point of --

SCHIRRA: Within reason, yes.

QUESTION: General Ritland, in enumerating the areas of responsibility you didn't mention, I think, recovery systems and techniques. What agency has the responsibility on that?

POWERS: We have a joint agreement with the Defense Department. Our recovery force is under the Fourth Destroyer Flotilla, United States Navy organization, under the command of Admiral Smith, of Norfolk. It is a joint force.

QUESTION: That is the recovery operation. But what about recovery systems? We are confronted with the problem of getting one or more of these fellows to back out of this circle up there. So far, as far as I know, we haven't managed to get a milk bottle back.

POWERS: McDonnell is manufacturing the capsule.

QUESTION: Who is minding the store as far as trying to work out a foolproof system?

POWERS: NASA, the Space Task Group. We have come about as close as anybody has come to recovering any object from orbit in our "Big Joe" shot about ten days ago at Cape Canaveral. We got near the velocities that we would normally encounter in reentry from orbit. This was the first of a series of steps in trying to prove out the system.

QUESTION: You are leaning heavily on the Discoverer recovery program for information, aren't you?

POWERS: We are acquiring as much data as it is possible to get from it. We want to take advantage of all they are learning.

GENERAL RITLAND: I think this is more in the environmental area, rather than a direct application of hardware to the Mercury capsule. We are not testing any specific components but getting information on the environment and procedures that could apply.

SHEPARD: Do you think we should explain before we leave this that we are not considering using the flying trapeze method? When we talk about recovery, we are talking about after the landing. Possibly you are talking about recovery coming back in. We are speaking of the capsule itself. As just pointed out, this is under the direction and guidance of the Space Task Group of the NASA, McDonnell being the prime contractor on it.

QUESTION: I would like to ask a question of everybody at the head table. Is there anybody at the table who doubts that the Russians hit the moon the other day?

COOPER: How do you know?

GLENN: I don't think we are qualified to comment on it.

QUESTION: I have a personal question. Despite all your work and backgrounding, in your free time, you must have some relaxation. Has your attitude changed at all toward relaxation? Is it like the longest pre-embarkation leave in history?

POWERS: I think I am better qualified to answer that than they are. I am sorry.

Admittedly I am not in as good physical condition as they are. If I survive this operation I will probably be in better shape than I have ever been in my life. Their relaxation is vigorous, if that is possible.

QUESTION: Are you number 8 on this list, Shorty?

QUESTION: I have one question. About two weeks ago -- two or three weeks ago -- there were some papers presented at a BMD-STL symposium up here at UCLA on space exploration. You probably remember, Dr. Doolittle. One of the papers was presented by a party from STL. In this they indicated that there was a considerable degree of work remaining yet to be done in the area of gathering data and parameters in the automatic escape system initiation, that is, levels of yaw, pitch, roll, or degrees of vibration; the acoustic attenuation between the boosters and the capsule at top of launch; condition of various fluids and so forth in the weightless state; and a number of these other things. At that time it was indicated to me that none of this work had really yet been done. However, that some of this data appeared to be available in the Convair overall data-acquisitional flight.

I was wondering if any of this has yet been taken out, and what you gentlemen feel is the status of this automatic ejection programming. Is there adequate data gathered yet for the activation of it, or would it be best left up to you, or what the status of that thing is.

DR. RUBEN METTLER: I might comment on that. There is certainly much work that does remain to be done. This of course is the purpose of much of the program between today and the time when these gentlemen may actually be in orbital flight.

So that there is an orderly program of flight testing and data gathering laid out.

QUESTION: On these particular items that were mentioned in the STL paper?

DR. METTLER: Oh, yes, this is what starts with the process of analysis and instrumentation. There will be specific measurements made on the flights that are scheduled, the next one and the ones after that.

QUESTION: In the intervening flights do they intend going back into the data that was gathered on previous Atlas flights?

DR. METTLER: Yes. We are using all, as you might imagine, information that we can get our hands on, so that in terms of understanding conditions for which, for example, the abort-sensing mechanism must be designed, this has been done and will continue to be done, every flight of an Atlas will in some measure contribute information. All past flights have been examined for their contribution to an understanding of this general problem.

QUESTION: Has this been accomplished fairly recently or some time back?

DR. METTLER: Really, it is a continuing process. It isn't something that just happened over night.

QUESTION: I was wondering what is the relationship between this paper saying what it did as recently as four weeks ago, from a party at STL, which is apparently cognizant of this part of the program.

DR. METTLER: I am pretty sure that if this paper was given at the symposium that it was probably about four or five months ago. The lead time normally in terms of submitting a paper, getting it approved, getting it given, is that -- I don't know the particular data on this paper, but it is probably some months old.

QUESTION: General Ritland and General Doolittle are both very experienced test pilots. I wonder if you can comment on how the background in and the detail for a single vehicle compares with your time in test flying in preparation for a flight.

GENERAL DOOLITTLE: I get the impression that my role here is one of contrasts, in order that you ladies and gentlemen may see the difference in appearance between an old aviator and six very attractive young astronauts.

GENERAL RITLAND: I think there is one real important factor here with regard to General Doolittle's experience and my experience, and you might say the new generation; and that is that in the business of flight testing which we are so familiar with in the Los Angeles area, that an understanding of these men, the people who are participating in the program, with previous experience in their area, is one that motivates and establishes a morale factor that is hard to beat.

We have discussed this earlier. General Doolittle and myself are not the only people who have done test work. We have other people in STL who have fabulous records in testing in different types of applications that apply to this particular program.

I think in the days that I was active in this that such a feeling would have made me feel good. I know the engineers, test engineers, had me do things that I thought were pretty ridiculous and pretty crazy. I hope these people have the sense that they can talk to the people who have an understanding of their problem.

GENERAL DOOLITTLE: I will go a step further than that. I have been 42 years in aviation. In the early days of testing there was no rapport between the engineer and the pilot.

The pilots felt that the engineers were a group of people with slide rules determined to make equipment that would kill them. The engineers in turn felt that the pilots were nuts or they wouldn't be pilots.

In 1922 there were some of us sent from the Navy and the Army to MIT, experienced test pilots, to become aeronautical engineers in the hope of starting the healing of that gap. I would say that that is probably the biggest difference between the early days of testing and today. There is complete rapport between the pilot today or the astronaut today and the individual who is making and testing his equipment.

QUESTION: Can you give us any idea on when you will have the first manned missile flight?

POWERS: I couldn't begin to give you a date.

We must prove out the capsule, push farther down the road on the astronaut training, get more range facilities, and then we will fire it. A lot depends on the upcoming series of "Little Joe" tests. We may or may not run an additional "Big Joe".

We will fire when we are ready. Obviously we have a schedule, but it is for purposes of trying to deliver hardware, this sort of thing.

It must be dependent upon proof. If we prove out the equipment, then we will get ready to fire.

QUESTION: Was this morning's Jupiter test connected with the flight support system at all?

SHEPARD: I am at a disadvantage first because I didn't hear the test.

QUESTION: This was with 10 or 14 pregnant mice and other animals at Cape Canaverall this morning.

SHEPARD: I think I had better pass that one.

POWERS: That particular test was a space-available basis, just like the monkey was. They are using biopacks. Although we get aeromedical data from them, they have no direct relationship to Mercury.

GLENN: I think we can say that almost any test that has a living organism aboard is of great interest to us. You notice that the roster of aeromedical people are at Langley in the space task group, and those people are continually visiting the sites and participating in these tests. There is our fund of information. This is all fed into our own individual problem.

QUESTION: Mr. Shepard, on the recovery system, is the Mercury Project committed to a capsule and parachute, or is it possible that the project as developed may turn into a glider recovery system?

SHEPARD: Insofar as Project Mercury is concerned, we are dealing with a pure ballistic or drag vehicle. As you know, generally after the reentry phase has been completed and the parachutes deployed, the parachute dessent is made for landing.

What we are calling Project Mercury includes only this type of vehicle. We are not planning under the name Mercury and lifting type.

QUESTION: In your specialization in this field of recovery, do you make recommendations to maybe future projects for two-man capsules, different types of recovery, or are you primarily concerned with this Project?

SHEPARD: We are primarily concerned with the Mercury Project. That is our immediate objective. When you consider what we do afterwards, what recommendations we make, I think your imagination can be any where. As you know, seven of us are still in the military. We have been loaned to the NASA for the purpose of this

Project. As such our inputs are primarily technical; directed to the Project itself. Whatever recommendations we make after the Project is over are anybody's guess.

We talked about the X-15 for a few minutes. We like to look at it this way: the X-15 is a lifting vehicle and provides finite control for picking out a landing area. People have asked us a couple of times how we feel about these two philosophies of a lifting vehicle versus a drag vehicle. We feel that actually there are probably two areas where they can be used. You can use a lifting vehicle for VIP transportation and a drag vehicle for the peons.

GEN. RITLAND: I would like to add to this general statement.

The X-15 and the Mercury Project Dynosoar-- the Air Force project, which could be considered a follow-on or combination of the X-15 and the Mercury, namely, a boosted lifting reentry vehicle. This of course is in the planning stages and is just about to get started, but would be what you could call the next generation of the combined X-15 Mercury program. So all of these contribute to the future objectives of the country in operating in space with the lifting reentry vehicle.

GLENN: I would make one additional comment on this, to get back to the design of Project Mercury. What we are trying to do is just see what a man can do in space, trying to put a man in orbit under these conditions of weightlessness, under real controlled conditions and find out what his reactions are and what happens to him up there, for instance, so we will know how to design future vehicles.

This is going a step further on what Al said. On the X-15 they are working a little more on the control system aspects of it under controlled conditions for a lifting vehicle, and as such we may eventually combine both these ideas in future space vehicles with what we found out about how the man operates in this condition that they are not going to get into with the X-15. Still they are going to have more experience probably than we will have in some aspects of the aerodynamic portions of reentry and control.

So these programs go along hand in hand and will be combined later on here into probably projects that we will all be in on the design of with information we have gotten in our respective programs.

QUESTION: I would like to ask Colonel Glenn: In a certain period of time this program will be completed. What would you picture your role to be after that? Go back to the Marine Corps, or what would you do?

GLENN: That is a real good $64.00 question. We don't know. We haven't been given any future outline of what our duties will be at the end of this program. We are enough concerned with this one right now that we are not worrying about that too much. We hardly envision, though, that we are going to get done and be the highly trained nucleus of people that we will be at a time when this project is done that we will be snatched out of it and put back as Club Officers at Cherry Point, or something like than.

It is possible but we think at least improbable at the moment. And I am not casting aspersions on Club Officers at Cherry Point.

QUESTION: I would like to ask the general a question: First of all, are the Astronauts satisfied with the Project Mercury to date? Is the Project Mercury on schedule?

GLENN: Yes.

COOPER: Let's put it this way: Yes, we are satisfied. Nobody should ever be completely satisfied with any test progress. He should always seek for better.

I think that we are satisfied that we are moving along satisfactorily on it. However, everybody would like to see us progress faster, naturally.

POWERS: I think the answer to the second part of your question is that essentially we are on schedule.

What was the third part?

QUESTION: Do you think that the Russian space achievement will have any bearing on your program? More money?

GLENN: It will affect it if they will give us the information they got.

POWERS: He is talking I think more in terms of whether we will get more money or more support.

COOPER: Do you mean as far as public opinion?

POWERS: This depends a great deal on what you gentlemen do and how you do it. We are moving along as fast as technology and our skills and our brain power will let us. The reaction to the Russian achievement is something that we don't have any control over.

GLENN: We are not in a drag race with the Russians on getting a man into space. We are not going to put a man up there in a can just hoping to get him back, like -- well, I won't say that they will do this, either. But we are not doing that. We won't go until ready whether the Russians go tomorrow, the next day, or a day ahead of us or a day after us. We will go when our project is good and ready to go.

QUESTION: Do you have any information on the Russians having a counterpart to your group, undergoing similar training?

GLENN: We have heard that they exist, but it hasn't been -- just what we read in the newspapers.

QUESTION: I am not sure that I understand what you mean when you say that you are not in a race with the Russians.

GLENN: We are not running a competitive man in space program with the Russians. We want to get there as soon as we can, naturally. If we beat them, fine. That is a feather in the American side of the cap, I guess.

But on the other hand, we have had more or less words put in our mouths sometimes in the past, so far on the program -- attempts were made, anyway, to put words in our mouths -- where we were all out to beat the Russians. And the implication was that maybe we were cutting corners trying to get there first and we are sacrificing a little safety to get there first, and this is not our intent at all.

This might be likened a little bit to the first Sputnik firing. There was a big flurry and a lot of action and so on. But looking back on it now I think that our space program in this country has come along in a much more orderly progression since then, and we have probably more technical information now than the Russians have gotten since then, even though there was a big flurry and they made the initial impact on world opinion by doing the first shot.

But as far as who is ahead now with technical information, I wouldn't say that they were ahead now just because they made the first shot. Our man in space program is the same way. It is laid out as an orderly progression to get us information, and we are not in any big race where we have to beat them to the wire.

POWERS: I think that on behalf of the space task group it is fair to say that we are not unaware of the significance and importance of getting there first, but it is not our only motivation.

GLENN: We are not cutting corners.

QUESTION: I would like to address this to anyone, if I may. Within the past 24 hours a very prominent man in rocketry has made public statements in the southern part of the United States -- you can guess who he is -- that we have complacency and red tape which are slowing us down in the field of rocketry.

I would like to ask any or all of you if, looking at it from your point of view, if you feel this red tape and are becoming enmeshed in it, and if you feel that complacency is holding you back? Do you agree?

SCHIRRA: I would like to answer that. Probably the most impressive visit we have had up until now is a visit to Huntsville, Alabama, to see the feverish activity of the group there, their intense devotion to the work, and the results that they have had; and the other parts of the program, the way the Atlas program has been doing so well with the intense effort and great work that they have done; and the other shots that we have had, the "Little Joe" shot that went off, and we have had the "Big Joe" shot, which was quite a thrill to us to see how well it worked out.

I don't see how anyone could legally, or even logically in his mind make a statement like that, realizing the great successes we have had; if the man would go around and see where these people are working, and the tremendous effort that is put out in the activity, I don't see how that opinion could be ventured.

POWERS: I think we are talking about two different areas. At our level -- and you can all disagree with me if you choose to -- so far in our program the cooperation and work and response and support that we have gotten from every agency in the country has been almost overwhelming. There has been no demonstration of conflict with regard to separate services or separate agencies or anything else.

I think that Dr. Von Braun was talking about the high management finding and procedural matters as opposed to our working level situation. At our level we don't see it.

GENERAL DOOLITTLE: I would like to take a little look in the future. I would like to dare to take a look in the future. Certainly our Astronaut program, from the point of view of propaganda, publicity and national prestige, is a very good thing. I see much more than that behind it. They tied in this morning the Astronaut program with the X-15. General Ritland tied it in with the Dynosoar.

You may remember that there was an Institute of Aeronautical Sciences meeting here about two months ago. Out of that came a belief that the next step in commercial air transportation would be to a Mach 3 airplane. There are Mach 2 airplanes and better flying today.

The best commercial airliner is a little under Mach 1. There is no apparent percentage in a Mach 1-1/2 or Mach 2. There are on the drawing boards and under production two Mach 3 airplanes today, one a fighter and one a bomber. Those airplanes, in my mind, will lead to the Mach 3 transport, and that is the next step in air transportation.

I envision not maybe in my lifetime, because there isn't a great deal of it left, but certainly in the lifetime of you people, a Mach 15 transport. That will be an air transport that will start in the earth's atmosphere, go outside of it, and reenter, so that your trip from New York to Paris will take you thirty minutes. This is the thing that in my mind these Astronauts are leading to.

GENERAL RITLAND: I would like to add to this comment or question of Pete Roberts. I think the term "complacency" on those projects that are approved and under way, is the responsibility of the people that are managing the program.

I would say that in our department there certainly is no complacency on projects that are approved.

With regard to red tape, you can always make a general statement: There is always too much red tape. This is a standard statement. In space there are so many things that can be done and that probably should be done, that when you balance this with the budget and what you can afford, it is impossible to do them all. So you get into the selective process of what is the best thing to do. And this is where you get the loads, and you might say red tape. But once a program is approved and funded, then it is our job to get it done. I couldn't say that in any of our work there is any complacency in this complex.

QUESTION: I would like to double up on this. First, your one-vision out is the periscope. Are there any turrets planned in the capsule, transparent ports that one can look out, if you pardon the expression, with the naked eye?

SHEPARD: I will pardon the expression.

Yes. Actually, the periscope that you just mentioned can be used for two purposes. It can be used as a navigation instrument, also for general observations.

Just leave it at that. It encompasses several items.

In addition to that, which can be interperted to be a back-up, if you will, will be a port through which the pilot can view the surroundings. The port is a fixed window. It has to be very carefully designed because of structural and heating considerations. Even though it is fixed, the pilot will have the capability of locating the capsule in various attitudes so that he can observe through this fixed window in whichever direction he desires.

Of course I think you can realize that this is a back-up, using the naked eye, for any kind of a flight attitude or rate-indicating system.

QUESTION: Is this true of all the control systems? Are these control systems within the capsule -- will actual control, for instance, be the firing of the retrorockets, the reversing of the capsule -- all that will be controlled from the ground, will it, except --

SHEPARD: Yes. The determining criteria in the design of the entire system -- Atlas, Redstone, and Mercury capsule -- is reliability. This has become a very important consideration. Insofar as it is possible in the state of the art, within weight considerations, we are providing parallel systems, one to support the other. There will be provisions for ground commands to reorient the capsule, and these ground commands can be parallel blocked or instituted by the pilot.

QUESTION: So far the whole thing is planned to be pre-programmed and autopilot, with the pilots manual only as the backup. Isn't that the general philosophy?

SHEPARD: That is the general engineering philosophy.

SCHIRRA: As we go farther with the program we will be doing just that, though; going into manual to see whether we can do it. With the X-15 their reaction control jets will permit them to penetrate space and return, and then they will have to go back to normal aerodynamic control. We will stay in orbit with almost identical three-axis control jets and maneuver. Not changing orbital path, maneuvering in the orbital path.

QUESTION: In attitude?

VOICE: In attitude.

QUESTION: Is sufficient gas provided for a definite finite time of maneuver?

SCHIRRA: As it is designed now, there is more than enough to with as long a mission as we have planned for the Mercury capsule.

QUESTION: In a continuing attitude change, or in obtaining a number of fixed attitude changes, or what?

SCHIRRA: That depends -- there is a certain volume that you have. You could go in there and put in full control, and obviously you will dump it out faster. If you make small changes, as an automatic system would do, you will probably use less fuel per minute or increment of time.

(Thereupon, the Press Conference was concluded.)

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NOTE TO EDITORS:

Attached is an addendum list to the satellite and space probe tabulations which have been distributed by the NASA during the past few months.

This latest listing will bring your fact sheets on U. S. and Soviet satellites and space probes up to date through Vanguard III, launched September 18, 1959. The previous list ended with the Vanguard launch of April 13, 1959.

Below are listed corrections to note on your earlier list:

December 6, 1957 - Vanguard, 1st column. Weight should read 3.25 pounds, instead of 3.4 pounds.

April 28, 1958 - Vanguard, 4th column. After EXPERIMENTS, should read Measure X-radiation from the sun and environmental measurements. After TRANSMITTER, should read 108 mc at 80 mw, tracking and telemetry; delete phrase "b." After POWER SUPPLY delete phrase "b."

May 27, 1958 - Vanguard, 4th column. After TRANSMITTER, should read 108 mc at 80 mw, tracking and telemetry; delete phrase "b." After POWER SUPPLY delete phrase "b." In 5th column, line 7. Delete "satellite" and insert "vehicle."

June 26, 1958 - Vanguard, 4th column. After EXPERIMENTS should read measurements of X-radiation from the sun and environmental measurements. After TRANSMITTER, should read 108 mc at 80 mw, tracking and telemetry; delete phrase "b." After POWER SUPPLY delete phrase "b."

From time to time we will issue further fact sheets to keep this tabulation up to date.

Walter T. Bonney
Director
Office of Public Information

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

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PRESS CONFERENCE

MERCURY ASTRONAUTS

San Diego, Calif.

September 25, 1959

PRESENT:

JAMES DEMPSEY, Manager of Convair Astronautics

JOHN POWERS, Public Affairs Officer, Space Task Group, National Aeronautics and Space Admn.

ASTRONAUTS:

MALCOLM S. CARPENTER

L. GORDON COOPER, JR.

JOHN H. GLENN, JR.

VIRGIL I. GRISSOM

WALTER M. SCHIRRA

ALAN B. SHEPARD

MR. DEMPSEY: Ladies and gentlemen: We are awfully happy to have you here this morning and to have the opportunity of talking to the six of the seven Astronauts. They have been here all this week. On Monday they received a general briefing from us about the last program and about their status. That afternoon they went on a very detailed tour of the laboratory and factory operations.

On Tuesday and Wednesday morning they received detailed briefings from the group engineers in charge of design of the several elements of our system. On Wednesday afternoon worked with our factory people, learning more about how we build the Atlas.

Yesterday morning they were out at our test facilities at Point Loma in Sycamore Canyon, and this morning have just come from a briefing by Mr. Ericke on some of our ideas about future space programs.

Now I would like to turn the meeting over to Mister Powers, who is ISO for the Mercury program.

POWERS: Thank you, Jim. I don't think introductions are necessary.

I have met most of the members of the press corps at one time or another during this week, and I think you have carried enough continuing reports of their activities and have their pictures so that you know the faces and the people, and we have name cards in front of them. We are on the record. We have no reservations about questions this morning.

I would like to suggest that you rotate your questions down the line. We have agreed among ourselves that we will rotate the questions so that we don't end up in a discussion situation with one Astronaut as opposed to the other five. For your information there are some photographs, some candid shots of the Astronauts taken in the plant, with Atlas hardware and Convair Astronautics people in the best situations we could record for you. For your use you are welcome to have these pictures.

Unless there are any other items of procedural business I will open the floor now for questions.

Perhaps to get the ball rolling I will ask the men to take about 30 seconds to a minute to let you know what their particular area of specialization is.

I might explain that in the conduct of the training and education program we have decided in NASA to ask each of the Astronauts to specialize in one subject area within the Project Mercury system. This does not mean that he is the only man who learns about this particular system, nor does it mean that the other gentlemen do not benefit by his knowledge. This is a double-barreled approach.

First of all, the men are all engineers, and this is the way they get an opportunity to make a contribution to the development of the system.

Second, it gives us an opportunity to specialize and to gather probably better knowledge and better information about each sub-system than we might otherwise get a chance to do. As each man goes out and broadens his own knowledge in his particular specialization area, he is obliged to make notes and document what he knows and bring it back to the other six.

I think the only other explanation I should make before we start down the line is that our seventh colleague, Captain Slayton, happens to be "Mr. Atlas" in our program. We regret that he is not here. He acquired a virus a couple of weeks ago and right at the moment he is in the hospital at Lakeland Air Force Base, in San Antonio, undergoing a complete physical evaluation so that we can give him a clean bill of health.

Gus, if you will start off the shooting by explaining to these very good people what your specialization is, we will get underway.

GRISSOM: Very briefly, my area of specialization is the flight control system, which includes the small reaction jets on the exterior of the capsule to control the attitude. These are controlled, then, by basically two systems: a manual system and an autopilot.

If everything goes normal, the autopilot will control the capsule throughout its orbit, maintaining its position, rotating it after it leaves the Atlas into its orbital position, maintaining it in its orbital position, and then setting up in the retroattitude for re-entry into the atmosphere.

If the autopilot doesn't work, then we have a hand controller and the Astronaut will control the attitude of the capsule manually.

GLENN: My area of specialization is the cockpilot area or the pilots layout. In other words the pilot's working space in the vehicle. This includes such things as the instrumentation, the way the information is presented to the pilot, operation of emergency switches, how we want these laid out, where we want different controls put; in other words optimizing the pilot's lay-out and the pilot's work space in the vehicle.

This has come in for considerable work already because it is quite obvious we had to settle on this part of the program very early so we could get going with building the hardware.

It is pretty well underway now. We think we have most of our changes made that are going to be necessary in this area and we will monitor them all very closely, of course, from here on.

SCHIRRA: My particular area is the environmental control system, sometimes called the life-support system. This includes the maintaining of the livable atmosphere within the capsule while in orbit and on re-entry and is backed up by the full pressure suit which again gives the man a full protection for orbital flight and re-entry.

Part of this responsibility involved the aid in helping all Astronauts make a decision on which suit to select. This is about what my program amounts to.

COOPER: My portion of the program is the combination of our capsule with the Redstone booster.

We use this booster for short practice missions in which we only go into ballistic-type profiles. We do not go into orbit. Thereby we can test out the environmental control systems and the reaction control systems and the recovery systems without having to undergo speeds that you need to lose to re-enter from orbital condition.

SHEPARD: I notice a real fine prop back here made by Convair at San Diego, and I think I will use it for a minute if you will allow me to.

This capsule we are referring to sits right here on top of the Atlas. As you can see, it consists of an area where the man is sort of lying down in this position. The area here, which is called an escape tower which has no particular significance to my area of responsibility. I just point it out to get you oriented as to what we are talking about here.

I am concerned with a few nuts and bolts in the capsule. Primarily the parachute systems which will prove a safe re-entry to the surface of the water; which is our planned landing point.

We have essentially two separate parachute systems. One is a small chute which comes out of the top section here, at some where between sixty-five and 70,000 feet, on the way down. The other section sits in here, which is a much larger chute and which blossoms out at about 10,000 feet on the way down. So we have this sequence coming down: a small drag chute pops out at about 65,000. That goes off at about 10,000 and a large chute comes out and is the chute that is used to actually let the capsule down in the landing area.

By the way, we have two large chutes in here, one being a standby for the first.

Another phase of my area of responsibility if the recovery of the capsule after it lands. We plan to provide two basic means for doing this. First will be a helicopter, which is capable of actually hooking on to the capsule as it floats in the water, lifting it and depositing it on the deck of a ship.

The second means would be for a ship itself to come alongside and through some mechanical device also lift the capsule on the deck of the ship.

I have one other area of responsibility and that is the tracking range, the chain of stations located around the world, which are in line with our intended orbital track.

These will provide communications so we can talk to the Australians, for example, on the way around. They will also provide certain tracking facilities through the use of radar and monitoring telemetry signals, that is, somebody off the Coast of Africa, for example, as we are going by for the first time, can say "His pulse rate looks pretty good, his heart looks pretty good, everything seems to be in fair shape."

Of course we intend to back up this little bit of information ourselves with voice communications.

Just a few locations of the stations would be of course Cape Canaverall, where we leave; Bermuda; the Canary Islands; Madagascar; Australia; possibly some in the Southern Pacific area; Honolulu; and a series of stations in the United States. These are all staged to follow the capsule as it goes around the Earth in its orbit.

CARPENTER: My area is entitled "Communications and Navigation." This is not a development of the equipment but rather a development of the requirement for certain types of equipment and integration of each item into the overall system.

There are two or three mechanical indicators or devices which will either plot or record our travel over the surface of the Earth, which come in under this field. There is a map chart which has required some special development. There is also a very fine optical system -- we call it the periscope -- which will give visual presentation of the Earth beneath the capsule, which will be from horizon to horizon.

POWERS: A couple of other things that I failed to mention that I think are appropriate here. One is that we are pleased to have with us in this conference this morning some very charming representatives of what I am sure must be some very excellent high school newspapers from San Diego.

I think that those of you on the regular newspapers might well be interested in knowing this. We are very, very pleased to have you here. All of the Astronauts -- as a matter of fact the idea was theirs; they suggested it; they wanted you here. They are tremendously interested in young people and the things that young people are doing. They hope that perhaps by their work and their attitude and their carrying out of this mission that they can inspire some of you and some of your associates to perhaps follow their paths.

Second, a quick procedural matter. We would like to run through some questions and answer time here. As soon as we finish that we will arrange whatever still pictures any of you might want. Then if there are television and radio people who would like to do some tapes or anything of that nature we will do that at the end.

Now we are open for questions.

Yes ma'am.

QUESTION: Carpenter mentioned the pressure system. I would like to ask whether the Astronauts in the capsule will be able to look up and around and to view what is happening outside, if that will be the only method he will have.

CARPENTER: We have two capabilities for visual observation. One would be through the periscope, which is normally oriented toward the Earth. By changing the attitude of the capsule we can orient the view received through the periscope on the Moon or in any direction. Over and above the periscope itself, a window will be provided directly above the pilot's head through which he will be able to see the horizon, it turns out, directly behind him, because as you probably know we are facing the way we have been in this particular set up.

QUESTION: I would like to ask your evaluation of the Atlas.

GLENN: I think we have all been most impressed with the people here at Convair. I know we have told some of the supervisors here the other day that not only have we been impressed with them in all of our dealings with them, but also we have been most impressed with the people we met on the line here the other day. When you can stop and talk to a man on the line and find that he is not only real proud of the job that he is doing but he is extremely proud to show it to you and talk to you about it and is very happy to meet you and know that some day you are going to ride one of the vehicle he has worked on, this gives us a very good feeling of confidence, and I am certain that we have all been impressed in that line in our visit here. This has been a real experience for us. We are very proud to be working with the people here.

QUESTION: Do you have any comments to make on the missile itself? Do you feel it is capable of doing what it is supposed to do?

GLENN: Certainly, very much. I didn't know what you were driving at. We have all the confidence in the world in its being able to perform the job it is to do.

QUESTION: Mr. Schirra spoke of a difference in atmosphere. What is the difference?

ANSWER: The difference that we will face is an atmosphere that is almost 100 percent oxygen. Ideally it would be 100 percent. The typical fuel-pressure suit that is in service today has an atmosphere maintained within the helmet only. Our suit will have a complete 100 percent environment. In addition, the cabin will. If the cabin has any damage to it, or there are some things we can't handle, or there is something wrong with the cabin system, we can isolate ourselves in the suit. This pressure will be maintained at an equivalent pressure of approximately 27,000 feet within the cabin and/or suit.

We, in orbit, will be able to open the visor or face plate of the suit and actually exist in the cabin environment.

QUESTION: In view of the recent Atlas explosion on the pad, do you have complete confidence in the system?

ANSWER: I am glad you asked that. I knew you would. Let me say this: In any previous aircraft build-up we have had over the years, or any automobile build-up, or anything of this type, there is bound to be some mechanical failure. I don't think that because an automobile fails to start, or you have a bad mishap with it, or because an aircraft has a mishap, that you lose confidence in the system. This is just the reason why on the aircraft and why on missiles or anything of this type you have a build-up program. It is also the reason that we have an escape system of course on this Atlas and on our Redstone booster. We are certainly not happy to see this happen, and we are sorry to see this happen as we are sorry to see any money go down the drain. However, it may be that in the long run it may prove to be extremely valuable in the information that we gather from it.

As it looks right now, by all the information we can gather, there would have been no problem at all on an Astronaut getting off of it before it happened due to the prior knowledge that they had that it was going to happen. He would have been able to have activated his escape system and to have successfully made his escape.

QUESTION: How much time would he have had to escape?

COOPER: He would have had a number of seconds of warning, which would have been ample. You don't need much warning.

QUESTION: Is there any method of escape from an Atlas say from time zero?

COOPER: Very definitely. We have an escape tower with rockets on it which will fire you safely away from the Atlas should something happen.

SHEPARD: Even before time zero, also.

QUESTION: Is this an automatic device or does it operate manually?

COOPER: It is both manual and automatic.

SCHIRRA: Maybe it wasn't clear that all of the front end of the framework in front of the capsule itself on the missile is the escape system.

POWERS: Let me check this capsule off. I think it is well to explain this a little bit.

The tower attached to the upper portion of the capsule is part of the escape system. You see attached to the top of the tower a solid propellant rocket with its three rocket exhaust jets on it.

The escape system can be initiated in one of three ways: Either automatically through abort sensing equipment built into the Atlas, which is being designed right here at Convair; it can be initiated by control command from the blockhouse; or it can be initiated by the pilot.

There are three ways to initiate the escape system. Any time the escape system is initiated the first thing that happens is that the retaining clamp which holds the capsule to the booster is opened.

Next the solid rocket fires. It lifts the capsule off of the rocket and gives it a horizontal displacement so that it goes up and away from the booster.

A maximum altitude sensor located in the upper antenna cap senses when the capsule reaches its apogee, if you will, it fires explosive bolts which separates the tower from the capsule, it blows the lid off the antenna cap, and starts the parachute descent sequence. The parachutes deploy, lower the capsule to either the Earth or the water whichever is appropriate, and the location and recovery aids are then initiated on impact.

QUESTION: What is the material of the parachute?

POWERS: Nylon.

ANSWER: The drogue chute and the main chute are of a little different design but they are both made basically of nylon material.

QUESTION: What is the wright of the capsule?

ANSWER: You have to qualify that in a way. It varies in a way as various things happen to it. In the neighborhood of a ton -- 2,000 pounds.

QUESTION: If it happens to fall in the water, will the Astronaut have a supply of oxygen? Is that all? Or will he be able to escape?

ANSWER: That is part of the environmental control system. It will support the Astronaut after landing in the water for a considerable period of time. This is measured in a great number of hours. It floats.

QUESTION: Is there an escape hatch?

SCHIRRA: Yes, there is an escape hatch coming up through the tower. We are having a modified escape hatch which will be installed which will permit him to get out through the side of the capsule. There will be flotation bags, by the way, also; in case it has a leak.

SHEPARD : It might clarify things to point out that if the escape system tower is not used in a normal mission, then just after staging of the Atlas the tower comes off anyway and separation is provided through a different rocket down at the bottom. So the solid part here is really what you have for your orbital mission. In coming back in you lose the top cap, so you have a door right up in the top here, which can be used to get out.

QUESTION: Have any of the Astronauts participated in any of the actual tests?

POWERS: No, they have observed it but they have not participated in the testing.

QUESTION: There was some surprise over the selection of seven men, all past 30. Despite the example of Archie Moore, do you think there might be a question of age beginning to drag by the time this thing is ready to go?

GLENN: No, not a bit. I think the selection criteria that was set up was the 40 age limit. This was set up with the idea in mind that by the time the mission comes off, anybody who was selected who was under 40, at the time of the selection would still be in plenty good shape to make the trip. I think we are all in pretty good physical shape. I don't think anybody is too far out of shape in the group here and will be in better shape by the time it comes time to run the mission.

QUESTION: When is it expected that one of you will go up in a capsule?

GRISSOM: We will go when all of the systems are ready, completed, and have been qualified. We hope that the sub-orbital flights will go sometime next year, and then the orbital flights possibly the year after that. But a lot of the equipment has to still be developed and qualified, and so it is pretty difficult to set a date of when it is going to go.

QUESTION: Will you draw lots to select the first man?

POWERS: We may have to. As far as we are concerned, at the NASA space task group, if these seven men maintain their current highly competitive levels of capability, probably the toughest part of this whole job is going to be to decide who goes. At the same time we will have the realization that no matter which man we pick, we will get the best one and we will have six just as good standing right behind him.

QUESTION: Mr. Dempsey, by the time the first Astronaut is ready to make the trip, what will be the odds against such an accident happening as happened recently?

DEMPSEY: Until the day before yesterday the odds were a hundred percent, but those had never happened before. It is the first explosion we have ever had on the stand. I don't like to talk in terms of numbers because they are fairly near meaningless, and in all of our discussions about the reliability of the system we have always known that reliability is less than a hundred precent, and what we have tried to do is make the total system, including the escape mechanism, a hundred percent reliable.

I have dodged your question very successfully, I think.

(Laughter.)

QUESTION: Once they get into orbit, how will you get the man back?

POWERS: Scott, youare the Navigator, why don't you tell her how you are going to get back.

CARPENTER: This is not exactly accurate. On the heat shield end of the capsule are three solid rockets. When it is determined that it is time to re-enter, and if the mission is normal, this will be somewhere North of Hawaii, the pilot or the autopilot, either, will orient the capsule approximately 45 degrees this way. He will orient the capsule in approximately this fashion, fire these three solid rockets that are attached to the heat shield. This will give him one component of force to slow him down, which tends to bring him down into the sensible atmosphere where he will be decelerated by the air. It gives him another component of force to force him down into the atmosphere. Shortly after this, this rocket package is jettisoned, the autopilot or the pilot again can reorient the capsule into the slipstream and will make the rest of his re-entry into the water with the heat shield facing the direction he is going.

QUESTION: Is the idea to catch the capsule on the way down as they have attempted to do in the Pacific or is it just the idea to get it into the water?

ANSWER: That is all. At about 66,000 feet a small chute, the drogue chute is deployed. This decelerates the capsule to below the speed of sound, and at around 10,000 feet the large 63-foot parachute comes out which should, we expect, reduce the rate of descent to approximately 30 feet per second prior to impact.

QUESTION: How long will the capsule remain aloft?

POWERS: How long is the trip, Wally?

SCHIRRA: You have to think of an orbit being approsimately 90 minutes. Our optimum flight path will bring us down the Atlantic Missile Range on the end of the third orbit, so this would be about four and a half hours.

QUESTION: What will you eat during the mission?

COOPER: The first mission will be four and a half hours. It may be that on some of the shorter missions we will try to eat. We definitely will have drinking water, which will have to be well enclosed in a container so it doesn't fly all around the cockpit. But the food also that we have along will have to be well enclosed and will have to be taken bite by bite. Certainly for the longer missions, as some of the later ones will be, we will get ample chance to try out drinking water and eating food. Food, by the way, is normal type food enclosed in small cubic sizes so that you can eat it bite by bite.

QUESTION: Will you be in radio contact with the earth upon re-entry, or are you on your own?

CARPENTER: Yes, except for the ionized boundary layer which will prohibit communications during the deceleration phase. But we will at all times be in communications except for this one short period while we are glowing red hot.

QUESTION: How will you know when to eject the top unit?

POWERS: The escape tower?

QUESTION: Yes.

CARPENTER: That is gone on the way up. The retrorocket package is automatically jettisoned immediately after use. If this function does not occur automatically the pilot can do it manually.

QUESTION: After the preliminary orbit around the earth, what will be the ultimate goal of the program?

GLENN: There are some longer missions

under consideration right now. I would just as soon not comment on those. They have not been finalized yet.

Twenty four hour missions are the longest ones on our particular horizon right now.

QUESTION: The escape rocket has to be used at what altitude?

POWERS: This depends on where it is used. We have had in static tests off the beach 2,400 feet of altitude from a standing start.

QUESTION: As pilots what do you think of going up in a chamber that is more or less controlled from the outside, contrasted to something like the X-15, where the power is fully controlled by the pilot?

GRISSOM: Our capsule can be fully controlled by the pilot also. The two programs mate in a way, the X-15 Program and the Mercury Program.

They have different objectives but both of them compliment each other and will increase our knowledge and help us to build bigger and better space vehicles, we hope.

QUESTION: I would like to know what rescue method will be followed if you are unable to get this capsule out of orbit with a man in it.

POWERS: Jim, do you want to field that one.

DEMPSEY: I would send for a priest.

COOPER: I would like to try that one. The actual decay of the orbit of this vehicle is such that we stand a fair chance, if the retrorockets do not fire, of the vehicle entering on its own. It looks a little grim heat-wise, but there is a very good chance that it would naturally decay on its own and re-enter and the Astronaut survive.

QUESTION: How long would it take?

COOPER: It would take several days.

DEMPSEY: I should say that the retrorockets are not a single rocket. There are three of these and they can be fired individually. So that although again the re-entry trajectory might not be the most desirable one, it would come down. The reliability of solid rockets is well known and the ignition systems is obviously one to which the McDonnell people who are designing it pay a great deal of attention.

QUESTION: There is the future problem of the oxygen supply.

COOPER: This is being designed at about the same level of the decay.

SCHIRRA: Actual supply should last about 48 hours without any problem at all. This will more than cover either a short or long mission. This is divided into two systems. We have a normal system and an emergency oxygen system. Both can be used under normal conditions.

QUESTION: Will it be sufficient for four days or just 48 hours?

SCHIRRA: As it stands now, I would say it would be about 48 hours overall. Again, I would like to make a point about the retrorocket system. Any one of the three rockets will bring us back in. When you take three highly reliable rockets, with an independent power source, absolutely independent power source to fire them, the odds --

QUESTION: Would you compare this program to the Russian program?

SHEPARD: Definitely our objective in this program is not to beat the Russians. Of course I think everyone realizes that we are in a technical race with the Russians whether we want to be or not. This is an unfortunate clash of philosophies. But the specific objective of our program is to evaluate man's ability to survive, to react, and to observe in the space environment. That is the objective toward which we are directing our energies.

QUESTION: Will you change the time table on the program at all?

SHEPARD: No, sir.

SCHIRRA: The analogy there is that if a new Ford comes out before a new Chevrolet you are not going to be out of the market for selling new Chevrolets. We are going in the same direction. We have got to get into space. We have got to find out things before we go farther in space. We obviously don't have a free exchange of ideas, so we have to go ahead with our own.

QUESTION: Are their specific medical objectives. Most of you gentlemen are engineers or test pilots by training. I assume medical aspects are fairly important.

SCHIRRA: They are. Space of course is the biggest unknown for physiological effects. The periods of weightlessness that man has actually endured have never gone much more than about a minute and a half. This is with a very high performance aircraft that can maintain enough thrust to get it almost to ballistic flight.

The Redstone flight will give us approximately five minutes of weightlessness. We go from five minutes to four and a half hours. So this is quite a big transition. We will learn a lot from each stepping stone of towers.

The other things that the medics will find out of course will be found out through electrocardiogram traces, blood pressure, respiration, and of course our own comments.

QUESTION: What about the radiation thing?

SCHIRRA: None of us seem to have any concern about this. The Van Allen Belt, as it is called, is at a considerably higher altitude. Not all the data has been reduced on the characteristics of the Van Allen Belt. But we have been assured that the dose of radiation that we would even think about that would bother a man is at an altitude of approximately 700 miles. We are considerably lower than that.

QUESTION: What about cosmic radiation?

SCHIRRA: This is another thing that has not seemed to affect any of our problems. We do have a rather thick capsule, you will recall. To our knowledge we have no worries about it, either.

QUESTION: Has the recent Russian hit upon the moon upset the Project Mercury at all, speeded it up or intensified it?

COOPER: I don't think in our project we will directly feel any particular effects. I think all of us were happy to see them succeed from a technical point of view. I think that we just as individuals are glad to see people succeed in getting into the space program. Naturally we would like to be first. But not directly I don't think we will see any particular effect from it ourselves.

POWERS: I think on this matter of the relative positions of our program vis-a-vis the Russians', as far as the Agency is concerned, we are not unaware of the political implications and the political advantages involved in being first. At the same time this is not our only motivation. We are progressing as rapidly as we can but on a careful and planned basis, and we expect to continue to do just that.

QUESTION: Will the astronauts have any difinite duties while the capsule in in orbit?

GLENN: We will have some definite duties mainly in the back-up field. Most of the systems are automatic. We will have back-up duties to perform, instruments to monitor and we will try the food and water that you spoke of earlier.

In other words, part of our mission is to find out what a man can and cannot do in space, but do it under conditions of automation, if you would, where he gets back not by his own ability but automatically if he finds that he can't cope with what he runs into. So we will have a number of tasks like this in the way of reports to make and instruments to read and things to do to find out what we can do in space, really.

QUESTION: Have you any definite duties to perform, or will they be more or less there enjoying the ride?

QUESTION: Can you give me some examples?

GLENN: Instrument readings, for example. We would almost have to break out the instrument panel to answer that. There are quite a number of instruments in the way of suit pressure, cabin pressure, the electrical system, monitoring that to see that we have the proper voltage amperage, monitoring the attitude indicators, user rate indicators, you will have the periscope that Scott mentioned, we will be checking our position on that and making position reports.

It will be a very busy time. We won't be going to sleep any on this four-hour orbit I am sure.

GRISSOM: Observing the earth and sky is another important function. This will be the first time man has ever really had an opportunity to see the earth from this viewpoint, and the heavens, also.

QUESTION: What about one of the contentions that the orbital system should be ready the year after next. When will you gentlemen be ready? Now, next year, the year after next?

GRISSOM: We are ready, but I think we could do better with more knowledge, and this is the one gain we are getting.

QUESTION: Two related questions. Has a fixed orbit been determined, and what is the relation of the ships on the Navy's part to cover it. How many ships are involved?

SHEPARD: The answer to the first question is yes, a fixed orbit has been determined, not only in terms of altitude, which is mentioned to be about a hundred miles, but also in terms of inclination of the orbital plane. This of course means that you have to shoot for certain limitations of angle of launch from Cape Canaveral so that you will be in the vicinity of the tracking stations.

The answer to your second question, the deployment of fleet units has not been firmed as yet. The fact that there will be both air and fleet units available for the rescue has been firmed. Both units were used in the recovery of what we popularly call the "Big Joe" shot, the first time a capsule was actually fired from the top of Atlas two weeks ago.

The planned landing point will be down on the Atlantic missile range, and of course the majority of the ships and airplanes will be deployed in that area.

We also have plans for alternate landing areas after the first and second orbits as well. And I am sure, because of the nature of the program, that stations, ships, and airplanes will be at least on the alert throughout as much of the orbital track as we can properly allow.

QUESTION: Gentlemen, you say you are ready. I was wondering what will be the next step. Can you give us a sort of a view of what is going to happen. I know you have mentioned sub-orbital flights and that sort of thing. Can you tell us what will happen in the next two or three months?

POWERS: We have a rather long range training and education program outlined for the Astronauts. It is generally more of what we have done already. As we progress closer and closer to mission time, obviously we will bring the boys up to a finer edge of capability. I suspect we will go back and do some more training on the centrifuge at Johnsville. We will be getting delivery on our pressure suits in the very near future. This means that we will have a requirement for familiarization with the operation of that pressure suit and experiencing different environments in that pressure suit.

Going down the road further we will then get to the point where we will have Astronauts flying sub-orbital missions on the Redstone. Simultaneously Mr. Bob Gilruth and the staff back at the NASA Space Task Group will be pushing forward on the test and qualification of the capsule and other hardware.

Undoubtedly there will be some exercises to test the world-wide range which is now under construction. All of these things are going forward concurrently.

QUESTION: I would like to ask you about the sub-orbital flights. Perhaps this knowledge is common, but it is not common to me. When do you expect this will occur? A year did you say?

POWERS: In about a year. Within the year.

QUESTION: What will that mean? What will happen?

POWERS: We picked a missile that is ready, readily available. We don't need the power to get into orbital speed. We also want one that is relatively reliable. These flights will be strictly ballistic flights which will go slightly over a hundred miles in altitude and down range into the Atlantic Missile Range approximately 200 miles. In these we have approximately five minutes of zero-G conditions. Then the capsule will start its re-entry, however, from much slower speed. It won't have this orbital speed to kill off, so the heating will be much less severe and deceleration forces considerably less.

We will test out the normal re-entry devices, the drogue chute and the standard parachute.

QUESTION: Are there going to be a number of these?

COOPER: There will be several of these flights, right. We hope that most of us will get these flights in, and these will be training for us as well as a good check-out of all the various systems in the capsule.

QUESTION: [illegible], Is it one hundred percent certain that the pilot who will go on this orbital flight will not black out, and if so what is the guarantee of accuracy?

SCHIRRA: The acceleration profile -- if you are acquainted with the term "G" -- "G" is your normal weight in the earth's environment -- we will experience on a normal mission no more than eight and a half to nine Gs. The big break-through on the whole program, the fact that man can ride this bodacious afterburner here, is this couch that we have. The couch puts us in what we call a transverse or supine position. We have all experienced as much as 16 G in the Johnsville centrifuge. The low order of "G", eight and a half to nine G, in comparison to sixteen, leaves no physiological effects at all. So we don't experience any loss of faculties and control.

QUESTION: Is there anything planned after your first orbital flight around the world for the other six Astronauts?

CARPENTER: Yes. I think that there is a misconception here. There will be three orbit missions. But the end result of this program is AN eighteen-orbit mission. I think by the time that it is all over everybody will have had a chance to do one or the other.

POWERS: John, you had some comments previously about this being the beginning. Would you talk to that point?

GLENN: We have tried to do away with a lot of this talk about who is going to be the first on this, because we feel very strongly that this is so much bigger than whose name happens to be on the first ticket on this thing. The press a lot of times in the past, in some interviews, have stressed so much this "first" aspect of this thing, as to which one of us is going to be first, as though we are out trying to knife each other every night to see who was going to be first or something.

It is so much bigger than that. We wish that the press would look at the big picture on this thing. This is a beginning of man's space flight, something that we have dreamed about for thousands of years. It is so much bigger than any one individual in this thing. We would like to get away from the "first" aspect. This is a beginning of many flights. Actually the second and third and fourth flights may accomplish far, far more, scientifically, than the first flight does. That first mission is going to be sort of an "Oh, gee whiz, look at me, here I am, Maw" type of deal, and you are probably going to get a limited amount of data back from it.

The second flight, once a man has been briefed on what to expect, may accomplish a lot more scientifically than the first flight does. So we would like to sort of play down this "first man" aspect of this thing and look at it as the beginning of what it is, really, man's space flight, which is a real big deal. We are all aware of that I am sure.

GRISSOM: I have a request, not a question. As you might have guessed, most of us have scrap books, so we would like to get copies of the school papers, if you would send them to us.

POWERS: We will.

You may send the requests to me and I will handle them for you. I am Lt. Colonel John Powers, Public Affairs Officer for the NASA Space Task Group, at Langley Field, Virginia. That also goes for space cartoons. People have sent the Astronauts a number of space-man type cartoons which we have posted on the wall. If you run across interesting spaceman-type cartoons we would like to have them.

QUESTION: With regard to this first man in space subject, is there a second platoon coming along?

POWERS: We have seven Astronauts in training now.

QUESTION: I mean these are the nucleus?

POWERS: Not in our program.

We appreciate all of you coming. We thank you for your interest and your very intelligent questions. We look forward to coming back to San Diego soon again and look forward to seeing you when we come back.

(Thereupon, the Press Conference was concluded.)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

NASA Release No. 59- 225
For Release: Sunday,
September 27, 1959

NASA FLIGHT RESEARCH CENTERED AT EDWARDS, CALIFORNIA

The National Aeronautics and Space Administration is reorienting its aeronautical flight research program and will conduct all but a small part of its test flight operations at the NASA facility, Edwards, California.

Simultaneously, the name of the California site is changed to reflect its mission. Previously called the High Speed Flight Station, the facility now is named the NASA Flight Research Center.

Reasons for the reorientation are the need to conduct high speed test operations away from congested airlanes and built-up areas, and the economy which will result in centralization. The Flight Research Center is located on a remote area of the California desert.

Both the Langley Research Center in Langley Field, Virginia, and the Ames Research Center, Moffett Field, California, will conduct flight research in the low-speed ranges, mainly with vertical takeoff and landing (VTOL) and short field takeoff and landing (STOL) craft. The Lewis Research Center in Cleveland, Ohio, will continue its small-scale flight program using low-speed propeller and jet aircraft. Currently, the Lewis program involves research in zero gravity.

A study is now under way to determine which flight research projects at Langley and Ames will be transferred to the Flight Research Center. Most high performance aircraft now at these centers will be returned to the military or transferred to the Edwards facility.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

Release No. 59-226
EX 3-3260
Ext. 6325

For Release:
10:00 A.M. EDT
Monday, Sept. 28, 1959

SATELLITE RELAYS EARTH IMAGE

A crude image of part of the earth's surface and cloud cover has been made from signals received from the Explorer VI earth satellite launched August 7, 1959.

The picture covers a broad area of the central Pacific. It was made from signals received by the South Point, Hawaii, tracking station on August 14. At the time of transmission, Explorer VI was about 17,000 miles above the surface of the earth--crossing Mexico. Thus the area photographed was more than 20,000 miles from the satellite.

The two-pound camera device which took the picture was made by Space Technology Laboratories, Inc., of Inglewood, California, the major industry contractor involved in the satellite experiment conducted by the National Aeronautics and Space Administration in cooperation with the U. S. Air Force Ballistic Missile Division (ARDC).

While the earth was in the camera's field of view, the relative positions of earth, sun and satellite allowed only a crescent of the sunlit earth to be seen. The southern-most portion of the crescent pictured was not obtained because the transmitter was turned off. The black indentation in the upper right portion of the crescent was caused by loss of data.

A 40-minute signal transmission from which the picture was made was received between 0105 and 0145 Universal (Greenwich) time, August 14. So actually the picture signals were received in Hawaii at 3:45 p.m. Hawaii time on the afternoon of August 13.

At the time, the central portion of the Pacific was lighted while the North American continent was dark and Asia land masses were over the satellite's horizon.

In the image, scientists can discern cloud banks in the large white areas at the upper and lower parts of the crescent. The white area near the horizon in the equatorial region is believed to be sunlight reflected from the atmosphere or ocean.

An extremely small video bandwidth, 1.5 cycles per second, was employed to transmit the picture to earth. In contrast, commercial TV requires a bandwidth of about 4 million cycles per second. The difference is that a commercial television system transmits a complete picture in 1/30 of a second, whereas the earth image received from Explorer VI required 40 minutes for transmission.

The STL open lens camera consists of two parts: a tube containing a mirror which receives and focuses light and dark impressions and an electronic counter which computes and records the impressions before they are converted into radio signals. The payload is spinning about 2.5 times per second to give it stability. Once per revolution the camera unit records the light or dark impression that it sees in the form of a coded electrical impulse. The impulse can be reduced to a single dot.

A row of dots forms a line and eventually the lines form an image.

While the image is obviously a crude first effort, it does prove the system is feasible.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON 25, D. C.

For Immediate Release
Monday, Sept. 28, 1959
1 p.m.

Remarks by T. Keith Glennan

Administrator

National Aeronautics and Space Administration

before the

Economic Club of Detroit

Detroit, Michigan, September 28, 1959

It is an honor and a very real pleasure for me to speak from this platform today. Being mindful of the many demands made upon the time of the people in this room, I am going to get down to business without further preliminaries.

My purpose this noon will be to discuss with you a number of the questions that have urgent bearing on the space program of the United States. They are questions I have had to ask myself as the head of the National Aeronautics and Space Administration. But they are questions, also, that I have asked myself as an American citizen involved in the anxious mid-years of the Twentieth Century. Before completing this discussion, I hope to have made clear to you my own convictions in these matters.

On the wall of my office in the research and development laboratory I had the honor of directing during the war was a placard listing the questions we all asked ourselves before we undertook a new project. The wording on the placard went something like this:

Why should we undertake this project?

Why do it at this pace?

Why do it this way?

Why do it now?

Why do it at all?

These were and are common-sense questions. They require solid answers involving somewhat more than technical or scientific considerations when one is dealing with projects that are national and international in scope. They can be applied to any research and development program, even including the United States space program, large and complex as it is becoming, with all its requirements for technical manpower, resources, and its bearing on national policy.

Very well--why should the United States undertake a space program?

The question may seem a bit academic since we already are embarked on a program -- but I think it worthwhile to re-examine the validity of the decisions that launched us into this national effort. And that re-examination must be made against the background of American attitudes and beliefs as they existed in the ten years following World War II. For a few moments, then, let us review the backdrop against which the Space Age has been born in this nation.

At the end of World War II, many Americans were comfortable in the assumption that the Soviet Union was hopelessly backward in science. The United States had the atomic bomb -- had it exclusively.

The Russians were bogged down in reconstruction and in tangled economic problems, weren't they? And they were only a generation removed from a benighted medievalism. Obviously, these Johnny-come-latelies would not be able to develop the counterpart of our terrible A-weapon.

So it was fondly believed.

Yet four short years after we exploded our first A-bomb, the Russians managed to produce their own.

Only <u>nine</u> months after the United States had achieved the hydrogen bomb, the Soviet Union had it too.

Shocked, but not yet awakened, we drifted back into our siesta of complacency. But not for long!

Another severe jolt shook the Free World on October 4, 1957. As you remember, that was when the first Soviet Sputnik was fired into orbit, three months before our own first successful attempt. The fact that the Soviet Union began serious development of space technology six or seven years before we had more than a token program does not dim the luster of their accomplishment.

Again and again that first man-made, Russian satellite went beeping and spiraling its way about the globe. It passed over nearly every American city and town. At sunset and sunrise, its rocket casing was dramatically and frequently visible to the naked eye. People the world around beheld it and were impressed.

The story was repeated when the second, larger Sputnik II went into orbit -- again before we had been able to loft our first Explorer I satellite into orbit.

Now the American people were truly alarmed. They levelled criticism at our educational system, at the military establishment, at the Congress -- at almost any likely target. They demanded a vigorous space program.

Those were the circumstances when Secretary Neil McElroy created the Advanced Research Projects Agency of the Department of Defense. This agency pulled together the efforts of the separate military services on defense-oriented space projects and initiated others that were intended to provide the means for undertaking research and development in space science and technology. As you know, only last week, the active military space projects were made, once again, the responsibility of the individual services.

After extended debate, the Congress enacted the National Aeronautics and Space Act providing for civilian control of the nation's space program, excepting only those projects which were predominantly military in character. The exact words of exception are, "activities peculiar to or primarily associated with the development of weapons systems or the defense of the United States shall be the responsibility of, and shall be directed by, the Department of Defense."

Here let me say that in my opinion civilian and military space work cannot sensibly be walled off, one from the other. Rockets, instrumentation, launching pads, tracking, and the like for missiles and for the propelling of scientific payloads into satellite orbits or on deep space trajectories may be almost identical. To date, for instance, every one of the probes and satellites that NASA has launched has been propelled by rockets developed by the military services. On the other hand, various of the rocket systems of the future for which NASA now has responsibility, in turn, will be valuable for military space purposes. The atmosphere of exchange and cooperation between NASA and the DOD is being maintained quite satisfactorily -- and I see every reason for it to continue that way.

Now, against this briefly sketched background, let me suggest the most important reasons for our undertaking and continuing a strong program of research and development and operations -- a program in which we probe the space environment in search of new and fundamental knowledge about our own and other planets in our solar system and about interplanetary space -- a program pursued in the expectation that what we find, can and will be applied by our own and succeeding generations for the benefit of all mankind.

First -- there is the matter of competition with the Soviet Union. Implicit in the guidelines set by the Administration and Congress is responsible awareness that Soviet achievements in space technology pose a grave threat to the international prestige of the United States.

For decades the world at large has regarded this country as pre-eminent in most scientific, technological, and industrial fields. They have known us by our works and have judged them good.

But now the Soviet Sputniks are larger and heavier than our satellites. The Russian space probe Mechta went into orbit around the Sun millions of miles from Earth two months before our small Pioneer IV followed suit. And now a Soviet space probe has hit the moon.

These are spectacular achievements. Aside from their scientific merit, they focus the attention of the world on the Soviet Union. To those who have looked to us almost unquestioningly for leadership, they are bound to bring doubts and uncertainties as to the current quality and validity of that leadership.

There is no denying that the Russian successes in space have hit our prestige hard. But total success without some failures is contrary to scientific experience. And this is the part of the Russian space program that goes unpublicized.

The Soviets have managed to convince many, even in the relatively sophisticated Western nations, and certainly in the less industrially developed nations, that Russian achievements in space are the true measure of scientific and technological advancement and thus the measure of the strength of a culture. Achievements in space appear to have made more credible Soviet statements in other fields -- economic, political, and ideological.

The Soviet propaganda drive is especially impressive to the people of nations with little industry or technology of their own. Millions are taking the technological accomplishments the Russians publicize so well and effectively as models for their own ambitions. Not knowing fully how these advances were made, they reason that the Russian peasant hoisted himself by his bootstraps in less than a lifetime, lifting himself to technological peaks in all areas. Uncritically they wonder if other marginal peoples might not be well advised to step in quietly along behind the Communist bandwagon in the hope of being swept on to Utopia, overnight, and practically painlessly.

That, in essence, is the international problem we face. To counter the spreading Communist influence that is based on Soviet space accomplishments, it is imperative that the United States pursue its own space program actively, effectively, and with all the ingenuity we can muster.

The second of my reasons for a national space program concerns the matter of significant contributions to be made to the defensive strength of the United States. Advances in knowledge and in the development of operational techniques necessary to the performance of difficult research tasks in space will surely contribute substantially to the defense program of the nation. This point will become increasingly valid as the developing technology employed involves increasingly sophisticated methods of guidance, control, phenomena-sensing devices, and data-acquisition systems. The interaction between civilian and military developmental programs will be great in this new field, and the military services will be able to make effective use of the operationing systems that one day will result from research programs -- in communications, meteorology, and in navigation, among others.

A third reason -- the existing conviction that research in space will turn up great amounts of new information that ultimately will be useful to man. The point is often made that man's progress to date has resulted from his search for new knowledge and the application of that knowledge to his benefit in the eradication of oppressive conditions of labor, in the abolition of routine drudgery and in the elimination of hunger and disease. It appears reasonably certain that weather forecasting, communications, navigation, and geodesy are fields that will benefit from the use of space as a base for operational systems. In most of these activities, it seems clear that only with satellite-based systems can real advances be made, and in some, it appears that great contributions to the economy will result.

Fourth -- we have man's known unwillingness to leave unconquered any new and adventurous frontier, and thus the urge that pushes us toward manned space flight. We are confident in our conviction that unmanned, mechanized, and instrumented space vehicles will gain for us vast amounts of very useful information. But there is no substitute for man as an observer -- nature's finest piece of instrumentation, if you will, plus judgment. Thus manned space flight is the immediate symbol of supreme achievement in the space field. To me, success in this venture will be peculiarly a part of the pioneering tradiation that has made this a nation of individuals, free to risk their future as each may choose.

Fifth -- and this is related to the third reason I have cited -- we have every right to expect that significant improvements in techniques and processes in many fields of industry, unrelated to space exploration, will result from the research and development work undertaken in the nation's space program. This phenomenon is not new -- one has only to reflect on the tremendous developments in our civilian economy that have been derived, in whole or in part, from research and development supported by government in wartime -- be it hot or cold.

My sixth and final reason concerns the possibility of the discovery of life on the far-off planets. Such a discovery could very well become the crowning achievement of man's quest for knowledge in space -- an achievement that, historically speaking, could transcend any present considerations of competition with Russia or of near-future benefits from satellites and space probes.

Even if there were no other reason, we would be drawn on by the urge to know whether life, in whatever form, exists on planets other than our own. Here again is the human eagerness to cross new frontiers and explore new regions and mysteries. Man will not rest until he has satisfied himself on this question. Think how profoundly this quest may affect our thinking and philosophical outlook! And there is just enough evidence of the possibility of some kind of living matter on Mars -- perhaps only lowly types of vegetation -- to make this one of the most fascinating, if long-range, objectives of our space research.

While there are other good and compelling reasons for conducting a space program of considerable breadth and depth in this country perhaps these six will suffice for our discussion at present.

Of these reasons, the most immediately compelling are those having to do with possible or probable additions to the defensive capabilities of the nation from a military viewpoint and that of competition with the Soviet Union. Indeed, these are the principal reasons that justify the pace at which we now are proceeding. They provide most of the answers to the second question -- why do it at this pace?

Naturally, there is a pace and a critical size below which a research and development program of this type cannot usefully be pursued. We would all agree, I am sure, that we are above that level in our endeavors -- but are we far enough above it to serve our own best interests? Measured in dollars, the national space effort this year is budgeted at slightly more than $800,000,000 -- some $500,000,000 to NASA, the remainder to the space work budget of the DOD. What should it be in the years to come? This is a matter for thoughtful consideration -- consideration in which the committment of men and resources to this field must be weighed against committments to other important fields of national endeavor.

Now lets turn to the next two questions -- first, Why do it this way?

As you know, the field of space research is a costly one. Like research in atomic energy, space experiments make use of complicated, delicate, and expensive equipment -- and most of it is destroyed in the few minutes needed to place a satellite in orbit or to accelerate a probe to speeds high enough to escape into space. No single company or group of companies could justify the enormous investment required to carry out such a program. Thus there is no alternative to governmental control and funding.

The next question is -- Why do it now?

Congress debated and passed the Space Act of 1958 and the President signed it into law on July 29th of that year. The law calls for the "preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere." There is a sense of urgency expressed in that statement. In my thinking the preservation of this nation's role as a leader in this field in which there is only one other real contender does not permit us to run second.

But let me finish measuring reasons for our space effort against the criteria by which I have always tried to decide the desirability of undertaking a new project, large or small.

The last question, you will remember, having examined into all the others, was -- Why do it at all?

Now I submit that the answers given earlier in this discourse are sufficient in themselves to satisfy this somewhat redundant but necessary question. But I think back, too, to other great adventures undertaken over the centuries by men who had a vision of worlds yet to be conquered. Columbus, Faraday, or the Wright Brothers must have had a difficult time answering the questions put to them. I suspect their answers contained less in the way of real promise for the future well-being of mankind than the ones we can give in the space field at this early point in our program.

These men, and a host of other benefactors of the human race, all shared an outstanding characteristic -- an unshakable faith in the ultimate success of the undertakings to which they devoted their lives. And today we need just such faith to persist in our space ventures -- a calm, unyielding faith to quicken and strengthen our efforts, no matter what the obstacles are.

We cannot measure faith in terms of dollars or millions of dollars. It is something within ourselves ... in the way a nation of free men attacks and solves problems. A democracy achieves leadership largely through the industry and ingenuity of individuals who, although working as teams, approach a challenge as a personal matter.

We have been given a challenge, not only by the Soviets but by the millions of people all over the world who have yet to make up their minds whether to turn to the East or West. We must not refuse to carry out our destiny -- a destiny that depends, in large part, on fostering and improving all of our nation's capabilities in science and technology. And space is the newest and most exciting arena in which to extend our efforts.

We all recognize that the world is inexorably caught up in the flood of the times, a flood that individually none of us can stem or control. I have supreme faith that as a nation, wisely utilizing our resources and marshalling our individual capabilities, we shall ride out these turbulent waters and once again demonstrate the overwhelming and enduring strength of a free society.

As I mulled over these words, I was reminded of a passage in Shakespeare's "Julius Caesar." In Act IV, Scene iii, you will remember the words of Brutus:

> "There is a tide in the affairs of men
> "Which, taken at the flood, leads on to fortune;
> "Omitted, all the voyage of their life
> "Is bound in shallows and in miseries.
> "On such a full sea are we now afloat;
> "And we must take the current when it serves
> "Or lose our venture."

Gentlemen, I propose that we conduct ourselves so that we do not "lose our venture" in the space competition on which we are embarked.

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